BUTANE-PROPANE News

25¢

Specially designed

FOR SUPERIOR PERFORMANCE

with **L. P. GAS**

Grand

GAS RANGES

SAFE-TEE-KEE

Prevents accidental lighting . . . Prevents leakage . . . Safeguards the home by locking the gas supply—not the burners.

SAFETY OVEN PILOT

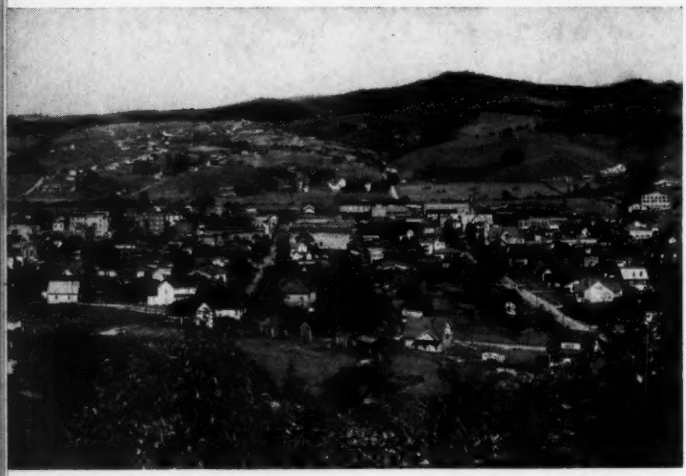
Can't be extinguished by drafts nor opening and closing of drawers or oven door.

AND RANGES · CLEVELAND, OHIO

ision of The Cleveland Co-operative Stove Co.

MAY 1942

★ HACKNEY BUTANE-PROPANE CYLINDERS ★



More Families Are Living Better— Thanks To You and Hackney Cylinders

In bringing the necessities of good living—gas cooking, hot water heating and refrigeration—to an ever-increasing circle of farm and urban families, you have helped to maintain the home front. Thousands of families depend on you for the health-guarding advantages of L-P Gas. Hackney cylinders play their part, too, in making these advantages possible.

Handling has been made easier and faster by these light-weight Hackney cylinders. Then, too, the decreased tare weight has provided important savings which the dealer or merchandiser has been able to pass along to the consumers. The initial cost of Hackney cylinders has been periodically reduced since the start of the L-P Gas industry.

Because of their dependability and complete user-satisfaction, Hackney cylinders have won a preference in the industry. Many improvements in cylinder design and manufacturing have been instituted by Hackney—with the result that you and your customers can obtain a better and longer-lived container.

PRESSED STEEL TANK COMPANY

General Offices and Plant: 1487 S. 66th St., Milwaukee, Wisconsin

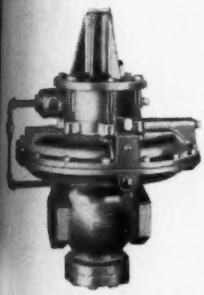
Containers for Gases, Liquids and Solids

★ During this emergency—while our Armed Forces are urgently in need of large quantities of material—while few Hackney propane cylinders can be produced—you can do your share by so distributing your cylinder equipment that the largest number of your customers are being properly served.

LPG

PRICELESS ASSET THAT MUST BE CONSERVED

For Accurate Measurement of Industrial Loads
EMCO Large Capacity Pressed Steel Meters



For Positive Control of Industrial Loads
EMCO "1001" Pressure Regulator

★ ★ ★ ★ ★ ★

NEVER before has the importance of LPG as a fuel been as fully realized as during the present emergency. All out war effort—total war—means total use of all of our assets, man hours, fuels and materials.

The efficient application of one of our most priceless fuels, LPG, can only be effected by accurate measurement and control. For years, EMCO Industrial Measuring and Regulating Equipment has been performing this function with the highest degree of efficiency and accuracy. We are pleased to be able to continue this service during these exacting times.

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Butane-Propane Meter

EMCO Large Capacity Pressed Steel Gas Meter

EMCO Type "B" Ejector Service Regulator

ROTOCYCLE Meter for Liquid Butane–Propane

NORDSTROM Lubricated Plug Valve

BUTANE-PROPANE *News*

Reg. U. S. Pat. Off.

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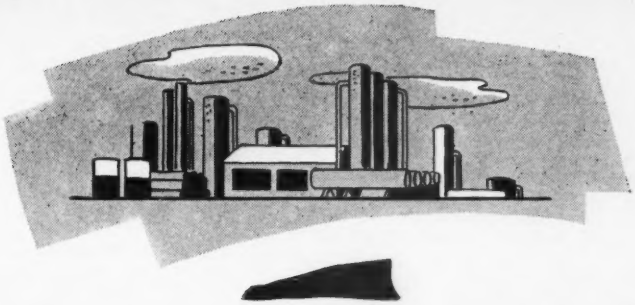


CONSULTING & CONSTRUCTION ENGINEERS TO THE LP-GAS INDUSTRY FOR THE ENGINEERING, DESIGN & CONSTRUCTION OF PLANTS FOR THE FRACTIONATION OF ALL LIGHT HYDROCARBONS

PARKHILL-WADE
CONSULTING AND
CONSTRUCTION ENGINEERS
1625 SOUTH ALAMEDA STREET
LOS ANGELES CALIFORNIA

LETTERS

Gentlemen:

I have been informed that pilot lights are not suitable for butane installations and that they should be disconnected.

Also, that unless a range is specifically built for butane there is danger of the butane having a bad chemical effect in about two or three years on the metals used. Where do these fellows get this noise about danger? Your comments will be appreciated.

H. B. M.

Kansas

There are two general methods for the adjustment of pilot burners. In one method the old pilot orifice is left in place and, if necessary, a pilot control valve is installed in the pilot gas supply line. Another method involves the purchase of a special orifice, less than No. 80 in drill size. These small orifices are formed with a tapered pin rather than with a standard drill to reduce the flow of gas to the required amount. Discussions of pilots appeared in Chapter 9 of "The Bottled Gas Manual" (March, 1942) and will appear in Chapter 11, soon to be published.

There is no unfavorable chemical effect of propane gas as compared with natural gas on metals. On this point reference may be made to the specifications of the Natural Gasoline Association of America for liquefied petroleum gas.

Although gas ranges designed for other gases have been converted to use propane in the past, experience has shown that reduced servicing and adjusting is required and that greater user satisfaction is obtained when gas ranges are installed which are specifically designed and approved for liquefied petroleum gases.—Ed.

•

Gentlemen:

What is best to use for doping connections using propane gas?

D. F.

Massachusetts

There are a number of firms manufacturing a pipe lubricant suitable for liquefied petroleum gas connections. Among them are: Electric and Carburetor Engineering Co., 2323 E. 8th St., Los Angeles; Rector Well Equipment Co., Inc., Fort Worth, Texas; Kerotest Manufacturing Co., 2525 Liberty Ave., Pittsburgh, Pa.; John Sunshine Chemical Co., Inc., 604 Lake St., Chicago, Ill.—Ed.

•

Gentlemen:

I should like to have some information relative to the cost of construction of a butane mixing plant. We have under advisement the proposition of replacing a failing natural gas supply with a butane plant. Any information you can give me relative to manufacturers of mixing equipment, controls, etc., will be appreciated. It would be quite helpful also if we could get some figures as to the cost of operation.

S.R.S.

Kentucky

Installation and operation of butane or propane air mix plants for substitution of failing natural gas or uneconomic manufactured gas plants is entirely feasible.

The cost of the plant will be contingent upon the send-out capacity required, present holder capacity, if any, and distance from the source of supply of the butane or propane.

Cost of operation is low as the plants can be designed to work automatically. The main cost of gas made is cost of butane delivered. For rough estimating the cost of gas having an equivalent heat value to 1000 B.t.u. natural will be approximately 10 cents per thousand per one cent cost per gallon of butane. In other words, butane with a delivered cost at your plant of 6 cents per gallon would be equivalent to 60 cents per M natural gas.

Most of the butane utilities in the country have rate schedules more closely approaching the manufactured gas company rates than the natural gas companies as the cost of product, plus freight, usually brings the cost of gas into the distribution system at figures ranging from 50 cents to $1 per therm.

Butane or propane air mixes can be pro-

duced that will operate in a natural gas system with little or no change in appliance adjustment, so the cost of change-over is the investment in storage and mixing equipment. The size of the plant is immaterial as far as successful operation is concerned.—Ed.

•

Gentlemen:

In reply to your letter of March 2, I have taken considerable pride in being one of the Charter members of this worthy paper. I read it from cover to cover each issue because I feel that the information and ideas conveyed are timely and to the point.

As you no doubt know, I am not in the LP-Gas business. My connection is with a city utility, but I have found your publication worthwhile as it keeps me posted on what is going on in the gas business as a whole. I am making prompt reply to your letter so that you will be able to stop my subscription, as I have found it necessary to enlist in the U. S. Navy. I have chosen this station as the most honorable thing to do under the present conditions. I hope that in the near future I will again be able to subscribe to your publication. With a deep sense of responsibility to a great cause, I remain,

Sincerely yours,
Homer L. Shelton

Des Moines, Iowa

•

Gentlemen:

Pease advise us where we can get a table or chart giving the amount of B.t.u.'s of butane or propane gas that the various sizes of drill openings will pass. We would like to be able to tell, for example, what size drill to use for drilling an orifice for a burner requiring 9000 B.t.u.'s, or any other size of burner.

H. H. T.

Kansas

If you will write to Harper-Wyman Co., 8562 Vincennes Avenue, Chicago, Ill., and ask for their "Table 1 on Propane and Butane Orifice Capacities of Wyman No. 1620 Fixed Hoods and No. 893 Spuds", you will receive detailed information such as you desire. Utilities Distributors, Inc., Portland, Me., sells a slide rule that gives orifice capacities. (See April BUTANE-PROPANE *News*, P. 49.)

There also appears upon Page 226 of the Handbook BUTANE-PROPANE Gases, Revised 2nd Edition, another table of orifice capacities for commercial butane. This Handbook is published by us and sells for $5 per copy.—Ed.

•

Gentlemen:

I wish to contact a company that supplies all equipment necessary for LP-Gas town plants.

M. L.

Mexico City

Any of the following firms can supply your needs: The Ransome Co., Emeryville, Calif.; Parkhill-Wade, 1625 So. Alameda St., Los Angeles; American Liquid Gas Corp., 1109 So. Santa Fe, Los Angeles; and the Gasair Corp., 155 Sansome St., San Francisco. Supplementary equipment may be had from many advertisers in BUTANE-PROPANE *News*.—Ed.

•

Gentlemen:

I am desirous of becoming a member of the LP-Gas Association. Can you furnish me with an application or refer this letter to the proper parties?

H. G. B.

Missouri

Your application should be addressed to the Liquefied Petroleum Gas Association, Inc., 11 West 42 St., New York City, and marked for the attention of Frank Fetherston, secretary.—Ed.

•

Gentlemen:

BUTANE-PROPANE *News* has been doing an excellent job in the LP-Gas field and we have found the editorial matter very helpful.

H. J. J.

Illinois

• **BUTANE-PROPANE *News* welcomes letters from our readers, but it must be understood that this magazine does not necessarily concur in opinions expressed.—Editor.**

PETER A. ANDERSON
Guest Editor for May

Our Brother's Keeper

By PETER A. ANDERSON
Chairman, Eastern Section, Liquefied Petroleum Gas Association

THE wealth and luxuries that people of the United States possess have been accomplished by the democratic spirit of being our brother's keeper. This is especially true of the small, independent business. These small businesses are feeling the war measures to a greater extent than any other civilian class. The retail of LP-Gas faces a drastic period, as LP-Gas is very little known to the public in general; and, furthermore, the already installed load is, perhaps, not sufficient to allow the small operator to make a living, as promotion definitely must be curtailed. Therefore, it is up to the industry leaders to find ways and means for the small marketer, or dealer, to live.

It is as equally important for the small marketer, or dealer, to have a voice in the industry, for a great portion of the load is derived from him. The voice of an individual would be lost in the clamor in Washington today but if he were united with all of the people engaged in the LP-Gas business, he would be recognized; and, consequently, the Association would have the necessary finances for additional representation to impress upon the government the value of our industry and its contribution to victory.

If all the marketers, or dealers, swapped ideas, or put them in a common pool for a committee to draw on, it might be surprising to find to what lengths some of the members are going in order to stay in business. Here is an LP-Gas advertising department running a canteen for defense workers in order to keep his department going; here is a little LP-Gas dealer working in a mill while his wife answers the telephone, and gas deliveries are made in his spare time. This lad is doing what the U.S.A. asks all of us to do: winning the war and saving his business. In the LP-Gas Association this could be accomplished by the Ways and Means Committee, who will welcome your thoughts.

Victory will be assured through unity and cooperation; lasting peace and success will be assured if we remain our brother's keeper.

Taking guesswork out of Pump Performance

OUR DEFENSE ASSIGNMENT

Manufacturing various ammunition components with the unvarying precision required by government specifications.

★ Thanks to constant testing by Tokheim engineers, there is never any guesswork about the performance of Tokheim LPG Pumps and Metering Units. All models of these rugged, efficient pumps are skillfully designed. Equipped with patented differential controls and positive piston displacement type measuring units, they assure rapid delivery and absolutely accurate measurement under all conditions. Weatherproof housing, safety "dead man" control, and cam type automatic nozzle valve are other outstanding features. Write for latest literature.

TOKHEIM OIL TANK & PUMP CO.

GENERAL PRODUCTS DEPARTMENT

FORT WAYNE INDIANA

MAINLY BEYOND THE MAINS

Freezing Orders

Two new orders issued by the WPB, L-86, dated April 8, and L-79, dated April 16, effectively freeze all stocks of LP-Gas equipment, materials and domestic gas burning appliances. This means that from a practical standpoint the LP-Gas dealer cannot take on new customers, and cannot increase the capacity of any installation already on the premises of any existing customers. There is no restriction on the sale of fuel to existing customers, provided no new capacity or new appliances will be required to serve it. Equipment can still be sold to dealers or to distributors where it is necessary to the maintenance and repair of existing plants or installations.

Order L-79 freezes all stocks of plumbing and heating equipment, and is so worded as to include all gas appliances if interpretations are so made. All new heating and water heating equipment is already frozen, and an unofficial opinion from Washington is to the effect that the order is intended to prohibit the sale of new gas ranges. This will require clarifying by an official interpretation which has not yet been issued.

The only safe rule to follow, in our opinion, is to install no new equipment or appliances until full and clarifying interpretations of both these orders are released by the WPB.

Live Off the Load

It is our opinion at the present writing (although all opinions are subject to instant revision in these times) that every effort consistent with the demands of war will be made by both the WPB and the OPC to spare the consumers of LP-Gas from the interruption of their indispensable fuel supply.

That doesn't mean, however, that government officials are sitting up nights worrying about the possible effect of the war on the individual dealers in butane or propane, or that their business survival is a matter of any more concern than was that of the automobile dealers, tire shops, or other retail enterprises that are now rapidly disappearing for the duration. War is

war, and the individual takes his own chances of survival in industry no less than does the soldier who goes into battle.

Only a few months ago it was customary to greet with enthusiasm any newcomer to the ranks of LP-Gas dealers. Then the accent was on new business, and the rapidity with which a new enterprise grew was generally in direct proportion to the intelligence, the energy and the initiative that its owner put behind his drive to sign up new users. Every sale was good for at least an installation charge plus the profit on a new gas range. And many customers went the whole way—gas range, water heater, refrigerator and, in some sections of the country, gas house heating as well. Looking back it is all too apparent that the most spectacular gains were made by those who concentrated on new installations and new appliance sales, and who regarded the gas that those appliances burned as almost, if not entirely, an incidental item of their business.

It is no mystery, then, that large segments of the industry and whole sections of the country were momentarily baffled and panic stricken when it dawned on them that almost overnight this expansion had ceased to exist. Yet, as harsh as the strictures imposed may seem to many, it cannot be denied that they are compelling the industry to face the facts of life and so regulate its internal affairs that it may best fulfill the only function that has ever justified its existence—that of rendering an essential service to the consuming public.

That this war will produce casualties in the ranks of LP-Gas dealers is inevitable. Some who fall by the wayside will be victims of their own shortsightedness and unsound business practices; others will be unavoidable victims, laid low by circumstances beyond their control. But of the thousands of dealers now in business, still supplying fuel in the face of increasing difficulties, there is still time for the great majority to tighten their belts, take up the slack of sloppy business methods, and stay in the fight.

The first essential for every dealer in the industry is that he must learn, and forthwith undertake, to live off his existing load. The factors involved are not complicated; they require observance only of the sound business practices that gas and electric utilities have understood and followed for decades. Yet they are rules that have been honored more in the breach than in observance by LP-Gas dealers.

A fundamental requirement is that gas must be sold at a profit, and that profit must be over and above all of the costs of doing business. The factors that enter into costs are too well known to

warrant their elaboration here. Strangely enough the two items most frequently ignored are interest on investment and charges for depreciation and amortization of equipment. Of course the owner's time is also a cost item, but what the hell—most of us are just in business for the fun of it anyway!

The service department is another rat hole down which dollars can be dumped, never to be recovered until the wreckers come to demolish what is left of the establishment. Now the service department must be made to pay its own way. That will necessitate charges for the servicing of appliances that must be kept working until some time in the dim future when they can be replaced. Domestic equipment is going to deteriorate during the war, and the longer it is kept running the more tinkering it will require to keep it in operation. No dealer can afford to underwrite this expense on behalf of all of his customers, and now is the time to discontinue it.

Delivery costs must be curtailed. Johnny-on-the-spot response to the frantic call of an improvident housewife who runs out of gas in the middle of a meal cannot be continued. The very valid argument that truck tires must be conserved by making deliveries only on regular schedules may end once and for all these nuisance demands from unreasonable customers.

Unprofitable accounts must be disposed of. Isolated customers who require long hauls for a single delivery may often be traded off for nearby accounts with other dealers where territories overlap. This may be a little difficult for some of the boys who have sold their gas as "hotter" or "longer burning" than that of a competitor, but they might as well face it. Better to lose a little face than to lose your whole shirt.

Does all of this sound dour and foreboding? War is a dour and foreboding business and we are in one. The only hard-boiled, realistic attitude now possible toward the present emergency is that it may last indefinitely, and that it certainly will get a lot worse before it gets any better. The quick victory dreams have gone up in smoke—the smoke of Burma and of Batavia. Official thinking and official planning are predicated on a war of from three to five years.

To hope that through some miracle the restrictions will be relaxed on our industry, the while they are piling up with ever-increasing severity on others is not only short sighted—it it suicidal. Our only trump card, our ace in the hole, is the one and three-quarters million families who must have LP-Gas if they are to eat cooked food. In their service the industry can and will survive. But it must live off the existing gas load.

NEW ORDER What Dealers Can Do—Form For Exceptions

ON last Jan. 14 the LP-Gas industry was restricted from many of its former operations by WPB Order M 68-c, an amendment to the original order governing the petroleum industry.

The incompleteness and, in some clauses, the vagueness of M 68-c caused industry representatives to seek a new order that would apply solely and specifically to LP-Gas operators. This effort has resulted in the adoption of Limitation Order No. L-86, released April 8. Editorial discussion and interpretation of this order appear on Pages 11-13 of this issue of BUTANE-PROPANE *News*.

The Order, itself, and the information necessary to supply the Government when operators seek permission for exceptions in order to make new installations which are believed to be essential, are published herewith.

•

GENERAL LIMITATION ORDER NO. L-86, LIQUEFIED PETROLEUM GAS EQUIPMENT

The fulfillment of requirements for the defense of the United States has created a shortage in the supply of Liquefied Petroleum Gas and Liquefied Petroleum Gas Equipment for defense, for private account and for export; and the following Order is deemed necessary and appropriate in the public interest and to promote the national defense:

Section 1167.1. *General Limitation Order No. L-86.*

(a) *Applicability of Priorities Regulation No. 1.* This Order and all transactions affected thereby are subject to the provisions of Priorities Regulation No. 1 (Part 944), as amended from time to time, except to the extent that any provision of this Order may be inconsistent therewith, in which case such provision shall govern.

(b) *Definitions.* For the purposes of this Order:

(1) "Person" means any individual, partnership, association, business, trust, corporation, governmental corporation or agency or any organized group of persons, whether incorporated or not.

(2) "Liquefied Petroleum Gas Equipment" means equipment (other than marine, rail, pipeline or truck facilities used in transportation of liquefied petroleum gas and other than equipment used in refining), or parts thereof, used to contain, distribute, or dispense butane, propane, propylene, butene, or any combination or dilution thereof, commonly known as liquefied petroleum gas.

(3) "Refining" means the operation of a plant or plants for the production of finished or unfinished Petroleum, including blending plants which blend neutral, bright-stocks and long residuum to finished S.A.E. grades.

(4) "Petroleum" means petroleum products and associated hydrocarbons, including but not limited to natural gas.

(5) "Material" means any commodity,

equipment, accessory, part, assembly, or product of any kind.

(6) Subject to subparagraph (8), "Maintenance" means the upkeep of liquefied petroleum gas equipment in a sound working condition with a minimum expenditure of material.

(7) Subject to subparagraph (8), "Repair" means the restoration of liquefied petroleum gas equipment to a sound working condition when such equipment has been rendered unsafe or unfit for further service by wear and tear, damage, destruction or failure of part or similar causes.

(8) The term "Maintenance" and "Repair" do not include either of the following:

(i) The use of Material for the improvement of liquefied petroleum gas equipment through the replacement of Material in the existing installation, unless the equipment which is replaced is beyond economic repair or has been rendered unusable by fire or other hazard or natural cause and is scrapped or junked;

(ii) The use of Material for additions or to expansion of liquefied petroleum gas equipment.

(c) *Conservation of Liquefied Petroleum Gas Equipment.* Subject to the exceptions in paragraph (d) hereof, no Person shall install liquefied petroleum gas equipment. Subject to the exceptions of paragraph (d) hereof, no Person shall deliver or otherwise supply, or cause to be delivered or otherwise supplied, any liquefied petroleum gas equipment for installation purposes.

(d) *Exceptions.* The provisions of paragraph (c) hereof shall not apply in the following instances:

(1) to any case where Material is to be used by a Person for the Maintenance or Repair of liquefied petroleum gas equipment;

(2) to any case where actual physical work of installation of liquefied petroleum gas equipment had commenced prior to January 14, 1942; *provided*, that such work of installation must then have been scheduled for completion and be actually completed on or before May 15, 1942;

(3) to any case where liquefied petroleum gas equipment is to be installed which liquefied petroleum gas equipment was installed and in actual use prior to April 1, 1942, and which liquefied petroleum gas equipment was subsequently withdrawn from such use.

(4) to any case where containers of equal capacity are exchanged (or a container replaced by one of lesser capacity) on the premises of any person in the normal course of distribution of liquefied petroleum gas;

(5) to any case where the Director of Industry Operations, War Production Board, has determined that the use of liquefied petroleum gas equipment is necessary and appropriate in the public interest, and to promote the war effort (including any such determination made under Conservation Order M-68-c). Application for such a determination shall be made by letter and filed with the Director of Industry Operations, Washington, D. C. Information to be submitted in such applications shall be in accordance with Form PD-397, issued by the War Production Board.

(e) *Required Certification.* Any Person acquiring liquefied petroleum gas equipment shall endorse on all copies of each purchase order or contract for such equipment which are placed with any Person, a statement in the following form signed manually or as provided in Priorities Regula-

tion No. 7 (944.27) by an official duly authorized for such purpose:

"The liquefied petroleum gas equipment which is ordered in this purchase order (or contract) is to be used in conformity with the provisions of General Limitation Order No. L-86, with the terms of which Order the undersigned is familiar.

Name of Person

By

Signature of Duly Authorized Official

Such endorsement shall constitute a representation to the War Production Board and the Person with whom the purchase order or contract is placed that the liquefied petroleum gas equipment obtained under such purchase order or contract will be used in accordance with the provisions of this Order. Such Person shall be entitled to rely on such representation unless he knows or has reason to believe it to be false. No Person shall, in the absence of such endorsement, deliver or otherwise supply, or cause to be delivered or otherwise supplied, any liquefied petroleum gas equipment.

This paragraph shall not apply in either of the following cases:

(1) to the acquisition of liquefied petroleum gas equipment by any Person for Maintenance and Repair, as described in paragraph (d) (1) above, where the equipment to be maintained or repaired is used exclusively by such Person for domestic cooking and heating, or,

(2) in the case of exchange or replacement of containers as described in paragraph (d) (4) above.

(f) *Preference Ratings.* No Person engaged in any operation covered by this Order shall be entitled to apply the preference ratings assigned by Preference Rating Order P-46 or Preference Rating Order P-98, to obtain Material for use in any operation covered by this Order.

(g) *Violations.* Any Person who violates any of the provisions of this Order or who by any act or omission falsifies records to be kept or information to be furnished pursuant to this Order may be prohibited from receiving further deliveries of any Material subject to allocation, and such further action may be taken as is deemed appropriate, including a recommendation for prosecution under Section 35 (A) of the Criminal Code (18 U. S. C. 80).

(h) *Effective Date.* This Order shall take effect on the date of issuance and shall continue in effect until revoked.

Issued this 8th day of April, 1942.

J. S. KNOWLSON
Director of Industry Operations

•

Coincident with the release of the LP-Gas order No. L-86, provision was made for members of the industry to apply for exceptions which, if granted, would permit new installations under certain conditions.

The principal requirement is that the proposed installation be essential to public interest and to the promotion of the war effort.

Form PD-397 has been prepared by the Government to serve as a guide for making application for such an exception.

•

FORM PD-397. HOW TO APPLY FOR EXCEPTIONS TO L-86

ADDRESS all communications to Plumbing and Heating Branch, War Production Board, Washington, D. C., Ref: L-86.

Before deciding that an exception be granted under the provisions in paragraph (d) (5) of General Limi-

tation Order L-86, LIQUEFIED PETROLEUM GAS EQUIPMENT, it is necessary for the War Production Board to determine the relationship of the specific case to other national defense needs. In order to perform this function the War Production Board must receive from the applicant a statement in quadruplicate containing the following information:

A. Name and address of applicant.

B. Type of installation and nature of permission requested with regard thereto.

C. Name and address of consumer.

D. State when work will be started, if an exception is granted, and expected date of completion.

E. List the equipment and material to be installed in the following order: (1) Items to be used not requiring priority assistance. (2) Items to be used on which priority assistance will be required. Show quantity and cost.

F. Explain in detail why this particular installation is essential to the public interest and to promote the war effort and why other fuels cannot be used. If the consumer is a manufacturer, list the products which will be produced through the use of this installation.

G. State whether installation will be of temporary or permanent nature. If temporary, how long it will be installed before being returned to your inventory.

H. If installation is of permanent nature state whether anticipated use is to be seasonal or year around. If seasonal, in what part of calendar year is use anticipated.

I. State what fuel, fuel consuming appliances or apparatus, if any, this installation would replace.

J. State whether for use with propane, butane, or mixture thereof, and estimated maximum monthly consumption in gallons.

K. Submit any other information which you consider relevant.

L. Each application for an exception shall bear the following certification executed in quadruplicate:

CERTIFICATION FORM

The undersigned hereby certifies to the Director of Industry operations that:

1. The foregoing application has been executed on behalf and by authority of the above-named applicant;

2. The facts stated in the foregoing application are, to the best of my knowledge and belief, true and correct;

3. If the exception hereby applied for is granted, use of material existing in stock or obtained by means of any applicable preference rating certificate or order will be made solely in accordance with the terms of the exception which has been granted, and, further, solely in accordance with the provisions of General Limitation Order L-86.

(Date) (Legal Name of Company)

Certification of applicant.

By

(Signature and Title of Official)

Name

(Date) (Signature)

Counter-certification of consumer.

Section 35(A) of the United States Criminal Code, (18 U. S. C. 80) makes it a criminal offense to make a false statement or representation to any department or agency of the United States as to any matter within its jurisdiction.

New Limitation Order No. L-79 and Industry War News

Limitation Order No. L-79.—In order to prevent the dissipation of existing plumbing and heating equipment stocks for non-defense building, modernization, or unnecessary replacements, the War Production Board on April 16 froze all such stocks, except for retail sales of $5 or less, or for any sale on an A-10 or better preference rating.

The order (L-79) covers all new plumbing and heating equipment, including any equipment, fixture, fitting, pipe, or accessory of a type used in or connected to a water, sewer, or gas system; or any primary heating unit or accessory designed to provide building warmth.

The order does not cover used plumbing and heating equipment, or tools used for installation and repair, or hoses, sprinklers, and similar devices commonly attached to outdoor faucets.

Any person may sell to a purchaser who certifies that the item is necessary for the installation of specifically listed farm machinery and equipment.

In effect, the order prevents the sale or delivery by a dealer or any other person of furnaces, oil burners, coal stokers, and a wide range of other plumbing and heating equipment if the item is to be used for non-essential purposes.

Disposal of inventories will be accomplished through the placing of preference-rated orders with manufacturers, dealers, and others. The Plumbing Branch hopes that retailers will sell a large percentage of their inventories of new equipment back to manufacturers and distributors. A rationing system for existing supplies is not contemplated at present.

•

New Maintenance and Supply Order.—Up to the time of issuance of the new industry order, No. L-86, materials for maintenance and supply could be applied for under preference rating orders No. P-46 and P-98.

The maintenance and supply order for LP-Gas men is now No. P-100.

The method to be followed is referred to in the paragraph of that order which reads as follows:

(e) Application of preference rating. (1) A Producer or Supplier, in order to apply the preference rating to deliveries of Material to him, must endorse the following statement on the original and all copies of the purchase order or contract for such Material manually signed by a responsible official duly designated for such purpose by such Producer or Supplier:

Material for Maintenance, Repair, or Operating Supplies—Rating A-10 under Preference Rating Order P-100 with the terms of which I am familiar.

(Name of Producer or Supplier and Serial No. of Producer if located in Canada.)

(Signature of Designated Official)

Such endorsement shall constitute a representation to the Director that such Material is required for the purpose stated and that the application of the rating is authorized by this Order. Any such purchase order or contract for such Material shall be re-

stricted to Material the delivery of which is rated in accordance herewith.

•

Fuel Oil.—In a move to conserve stocks of fuel oil in coastal areas, installation of new fuel-oil burning equipment in 17 Eastern States, the District of Columbia, Oregon and Washington is discouraged by Limitation Order L-56 issued March 14 by the Director of Industry Operations and effective immediately.

The order forbids delivery of fuel oil for use in any new equipment unless installation is completed within 30 days, or in any converted facilities unless the conversion is completed within 10 days.

Consumers now using fuel oil are also forbidden to accept additional supplies unless they are making full use of standby facilities using fuels or power other than electricity or natural gas.

The order provides for appeals in cases where its terms might work special hardship. The order does not apply to use of fuel oil in internal combustion engines.

•

Air Conditioning, Refrigeration.—Persons seeking to obtain preference ratings in order to purchase air conditioning or commercial refrigeration equipment are urged by the Air Conditioning and Commercial Refrigeration Branch of the War Production Board to submit in detail all the information called for on application forms PD-1A.

•

Plumbing and Heating.—Issuance of an order designed to facilitate the maintenance and repair of existing plumbing and heating installations in farms, residences, and office and apartment buildings was announced March 14 by J. S. Knowlson, Director of Industry Operations, War Production Board.

The order (P-84) assigns an A-10 preference rating, which may be applied by an installer or supplier, to materials needed for emergency plumbing and heating repairs. The rating may not be applied, however, to obtain copper already fabricated in sheets, wires, rods or tubes or to any scarce materials which can be eliminated by change of design or by substitution.

•

Price Ceilings.—New domestic heating and cooking stoves and ranges and new mechanical refrigerators were among the eight "scarcity" articles (others: typewriters, vacuum cleaners, washing machines, ironers, radios, phonographs) upon which the Office of Price Administration on March 23 put price ceilings to check inflationary movements.

The price on domestic cooking stoves and ranges was a 60-day temporary order pegging prices at the level of March 19. OPA explained that the price ceilings apply to each store *individually* and that the regulations no not mean that all stores must charge the same price for the same article.

•

Cooking Appliances.—Iron and steel allotments for gas, coal, wood, electric, kerosene and other types of ranges have been cut 35% below the monthly average for 1941. Bright work and "cover tops" are banned, with copper fittings severely restricted.

•

Domestic Mechanical Refrigerators.—Production will stop May 1. January restrictions were lifted for the February-April period to permit the building up of reserve stocks. A price ceiling has been imposed and a request issued by Price Administrator Henderson that prices be restored to February 2 levels. Effective February 14, retail stocks were frozen, ex-

cept that each store or chain was permitted to sell 100 refrigerators, or one-twelfth of the 1941 sales, whichever is greater.

•

LP-Gas Section Address. The Liquefied Petroleum Gas Section of the Plumbing and Heating Branch of the War Production Board will be located on the Fourth Floor, Wing 6, Room 4611, Railroad Retirement Building, 3rd and C Sts., S. W., Washington, D. C. The Railroad Retirement Building referred to is close to the New Social Security Building. John F. Steele has been named head of the Section under W. Walter Timmis, Chief.

•

100-Octane Motor Fuels.—The Federal Government's request for large, sustained supplies of 100-octane aviation gasoline comes as a result of its program to build and maintain 60,000 or more modern bombers and fighter planes this year, according to a recent issue of *The Oil and Gas Journal.* This number has been doubled for 1943.

The industry is preparing to supply the fuel well in advance of actual needs. Butane will be supplied to central isomerization plants where it will be converted to isobutane. Then, in those same areas, the material will be converted to the alkylate by polymerizing it with current supplies of butylene. Because butylene is a product of thermal cracking, and because there is general application of this type, the supply of butylene is adequate to fill all projected needs.

The expenditure for equipment needed to carry out this program will approximate one-half billion dollars or about six and one-half times the normal annual expenditure made by refiners for prefabricated refinery units. In metals, the program will call for the consumption of at least one-half million tons of steel, iron, chromium, nickel, copper, zinc and tin.

•

Synthetic Rubber.—The other major program to be undertaken by refiners is the production of butadiene, styrene and isobutylene for the manufacture of synthetic rubbers.

The recovery of butadiene from the dehydrogenation of butane and the synthesis of styrene and isobutylene in the required quantities necessitates concentrating operations in relatively few units. Already major units are being designed for assembly at points widely spaced across the United States, and within the year supplies of butane will be moving to these points for conversion and copolymerization.

•

More Capital—More Rubber.— Because the petroleum industry has developed raw material resources and technical process sufficient to provide for a tonnage of synthetic rubber in excess of the 700,000 tons per year reportedly required for the war effort, the Petroleum Industry War Council has presented to the Office of Petroleum Coordinator a resolution asking for financial backing to assist in providing 300,000 tons more.

This additional amount could then be applied to civilian needs.

•

New OPA Assistant.—Appointment of George W. Stocking, an outstanding specialist in the oil industry, as Assistant Administrator of the Office of Price Administration in charge of the Fuels Division, was announced April 11 by Leon Henderson.

•

Truck Production Stopped.—The WPB on April 12 ordered stopped all production of medium and heavy trucks for civilian use after existing quotas are completed.

SLOW DOWN
To Save Rubber and Gas

ALL America is rubber conscious. Every thought and consideration, from the War Production Board to the man on the street, is being given to the curtailment in manufacture and the care in the use of rubber and rubber products. The problem is additionally acute for each one whose business does not give him a high priority rating.

Interesting charts* showing approved methods of interchanging tires on the same vehicle to obtain even, uniform wear; saving in rubber when low speeds are maintained; bad effects of under inflation, and the greatly increased consumption of gas in proportion to reductions in speed are shown in Figures 1, 2, 3 and 4, respectively. Figures 5 and 6 show costs.

Within the ability of practically all dealers are several methods of conserving rubber which accomplish an additional economy in overhead costs. Among these are:

Schedule service trips so that same territory will not be covered twice within specified times, except for emergency calls. By careful mapping it is possible to cover given districts but once a month where formerly delivery and service trucks were used daily or weekly. This applies to delivery of gas as well as to servicing problems.

Garage cars at nearest possible places where they will be used subsequently.

Use other means than cars in

* This and other cuts in this article, through courtesy of the "Gas News," Southern California Gas Co.

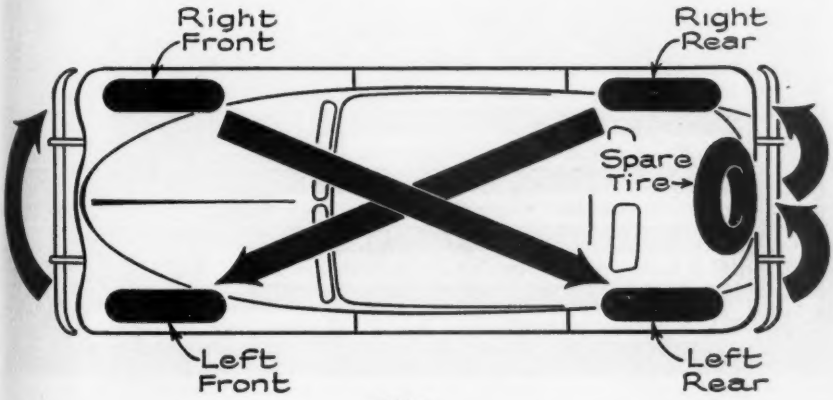


FIG. 1.
Diagram showing how shifting of tires every 5000 miles will conserve rubber.

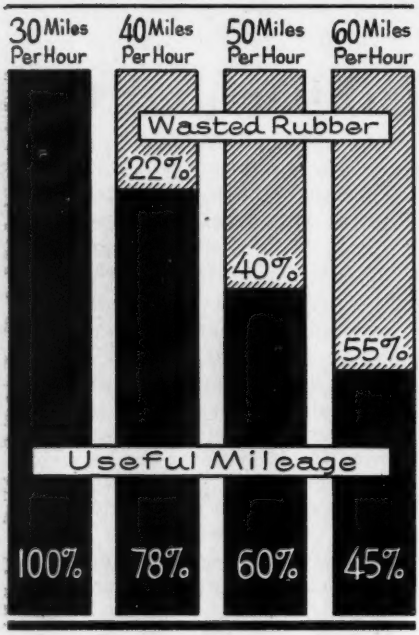


FIG. 2.

This chart, based on data compiled by the Firestone Tire & Rubber Co., reveals how the mileage can be increased by intelligently planned speed reduction.

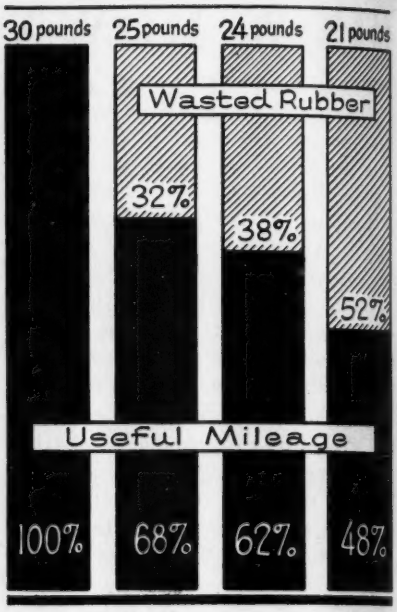


FIG. 4.

This is the way tire rubber is wasted by under-inflation. Normal air pressure was taken as 30 lbs. Your own tires may have a different normal pressure requirement.

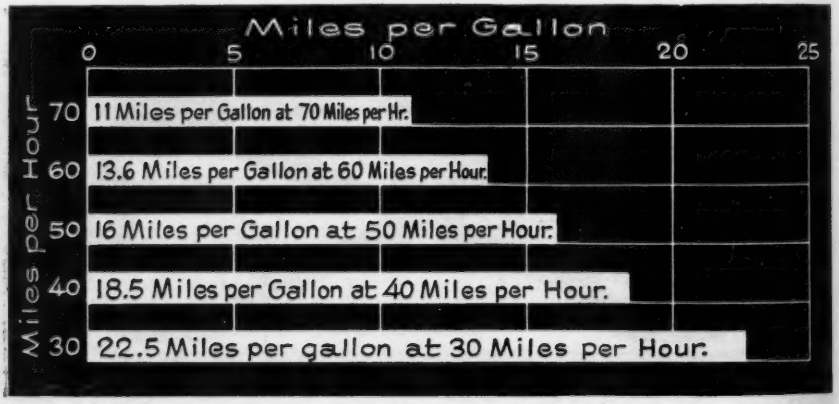


FIG. 3.

Chart showing how gasoline mileage decreases as speed increases.

TABLE 5*. OPERATION COST PER 1000 MILES

Miles Per Hour	*25*	*35*	*45*	*55*	*65*
Gallons	49	53	58	65	78
Gasoline Cost	$ 9.31	$10.07	$11.02	$12.35	$14.82
Tires and Tubes	$ 1.80	$ 2.03	$ 3.38	$ 4.75	$ 6.75
Oil and	3½ Qts.	3½ Qts.	4¼ Qts.	5½ Qts.	7 Qts.
Oil Change	$ 1.05	$ 1.05	$ 1.28	$ 1.65	$ 2.10
Depreciation and Maintenance	$ 8.00	$11.00	$14.00	$18.50	$25.00
Total Cost	$20.16	$24.15	$29.68	$37.25	$48.67
Cost Per Mile	2c	2 4/10c	3c	3¾c	4 9/10c

* Tables 5 and 6 were prepared by A. N. Kerr, Imperial Gas Co., Los Angeles, for the Travelers Insurance Co., Hartford, Conn.

going to work and returning home.

Arrange activities so that one car or truck will serve several purposes and enable laying up of surplus equipment.

Occasionally interchange tires on active cars with those on inactive ones so that no tires or tubes will become hardened or cracked.

Have employes double up on car usage in every possible way.

Some dealers provide their customers with Government post cards upon which customers may record their meter readings, thus saving costly trips every month for reading meters.

Overloads, also, result in excessive tire wear, according to authoritive sources. Taking 30,000 miles as normal tire life for trucks, and 35 miles an hour as normal speed, figures show a 10% overload substracts 18% from the life of a tire, while a 50% overload results in 60% loss.

On the other hand, underloads of 30% will double a tire's life; 20% gives 61% increase, and a 10% underload pays a 29% dividend.

When it is realized that many business firms and most of the civilian public will not be able to replace their present rubber for the duration of the war, close study and adherence to good economy practices in the use of tires will be invaluable to all dealers.

TABLE 6. COST OF EACH HOUR SAVED BY SPEEDING

Speed Increase	*Extra Cost Per 1000 Miles*	*Time Saved*	*Extra Cost Each Hour Saved*
35 to 45	$ 5.53	6.4 hours	$ .86
35 to 55	13.10	10.4 hours	1.26
35 to 65	24.52	13.2 hours	1.86
45 to 55	7.57	4.0 hours	1.88
45 to 65	18.99	6.8 hours	2.80
55 to 65	11.42	2.8 hours	4.10

THE BOTTLED GAS MANUAL

Chapter 10 The Fundamentals of Thermostats

Part 2

• **Part 1 of Chapter 10 appeared in the April issue of BUTANE-PROPANE News, pages 29-33. Questions and answers for both parts are given this month.—Editor.**

•

Evolution of the Hydraulic or Pneumatic Thermostat. In Fig. 2-A we have a simple bellows (hereafter called expansion coil) connected with a thermal bulb. Let the thermal bulb (B) be filled with liquid and subjected to heat. Pressure will be created within bulb (B) and expansion coil (A) and coil will expand in the direction of the arrow.

In Fig. 2-B we have the same coil and bulb, but against the free end of the coil we have placed an expansion plate (F). Into this expansion plate is screwed a valve stem at "G". When heat is applied to the thermal bulb the expansion coil will expand in the same direction as before, carrying with it the expansion plate and valve.

In Fig. 2-C we have placed the assembly within a housing and added a lot of "gadgets." By turning the valve stem into the bearing plate at "G" we can bring the valve (D) closer to its seat "M". As "E" is a square hole and the shaft which fits into it is squared, the valve is free to move in or out in relation to this shaft. Calibration is accomplished by taking a temperature reading in the usual manner and then turning the valve "D" in or out in its relation to seat "M," after which the dial "K" is placed in calibration with a temperature scale, or indicating point, on the thermostat body or range. Screw "L" is then tightened to hold the dial in its proper relationship with the shaft on which it is mounted. The adjustment of the low flame is accomplished through adjustment of the screw "P."

Gas enters at point "N" and passes between the valve "D" and its seat "M," then out to the burner at "O". When the desired temperature is reached the valve "D" closes against its seat "M" and gas for the low (by-pass) flame passes between "Q" and "P", then out through "O" to the burner.

The thermostat illustrated in Fig. 2-C is of course a theoretical one, and in actual practice the expansion of the coil is sometimes multiplied through a series of levers. An excellent example of this use of levers is found in Fig. 3, a sketch of a Wilcolator type M2 thermostat.

Another excellent example of this same type of thermostat, in which,

•

• **The Bottled Gas Manual series by C. C. Turner, started in the July, 1941, issue of BUTANE-PROPANE *News* and will continue to be published monthly in chapter form until completed. This series constitutes a valuable text book and field manual that should be invaluable to everyone in the liquefied petroleum gas industry.—*Editor.***

FIG. 2

EVOLUTION OF THE HYDRAULIC OR PNEUMATIC THERMOSTAT OF THE GRADUAL ACTION TYPE

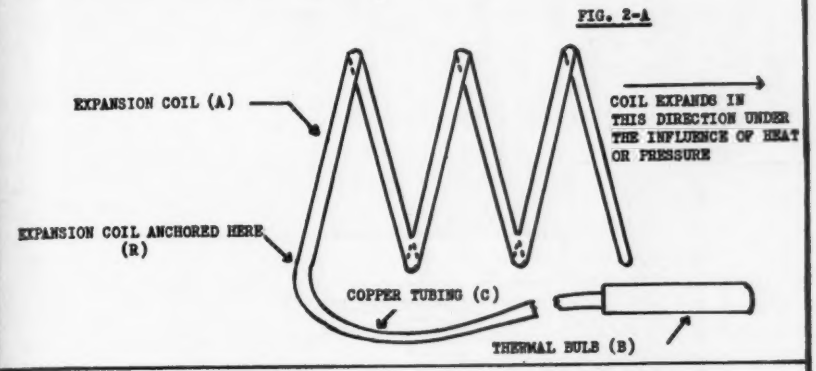
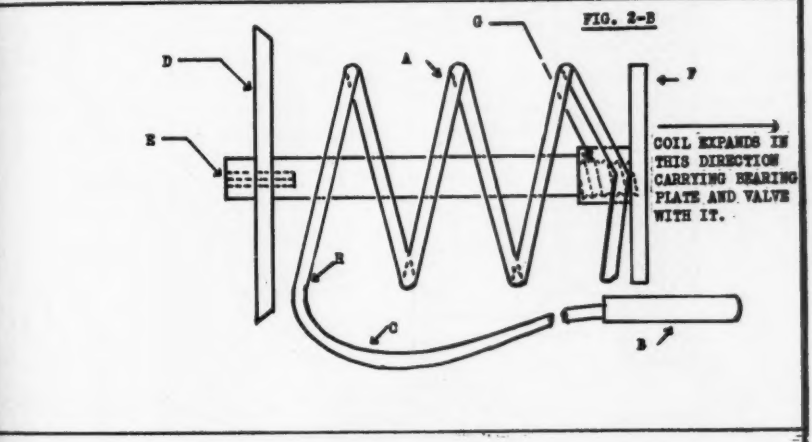


FIG. 2-A
EXPANSION COIL (A)
COIL EXPANDS IN THIS DIRECTION UNDER THE INFLUENCE OF HEAT OR PRESSURE
EXPANSION COIL ANCHORED HERE (R)
COPPER TUBING (C)
THERMAL BULB (B)



LEGEND

A- EXPANSION COIL
B- THERMAL BULB
C- COPPER TUBING
D- THERMOSTAT VALVE OF THE POPPET TYPE
E- SQUARE OR HEXAGON HOLE IN THE VALVE STEM
F- BEARING PLATE
G- VALVE STEM LOOSELY SCREWED INTO BEARING PLATE
R- POINT WHERE EXPANSION COIL IS FIRMLY ANCHORED TO THE BODY OF THE THERMOSTAT

however, the thermostat is a combination of gas valve and temperature regulating device, will be found in Fig. 3-A. This thermostat is manufactured by the Robertshaw Thermostat Co., of Young-

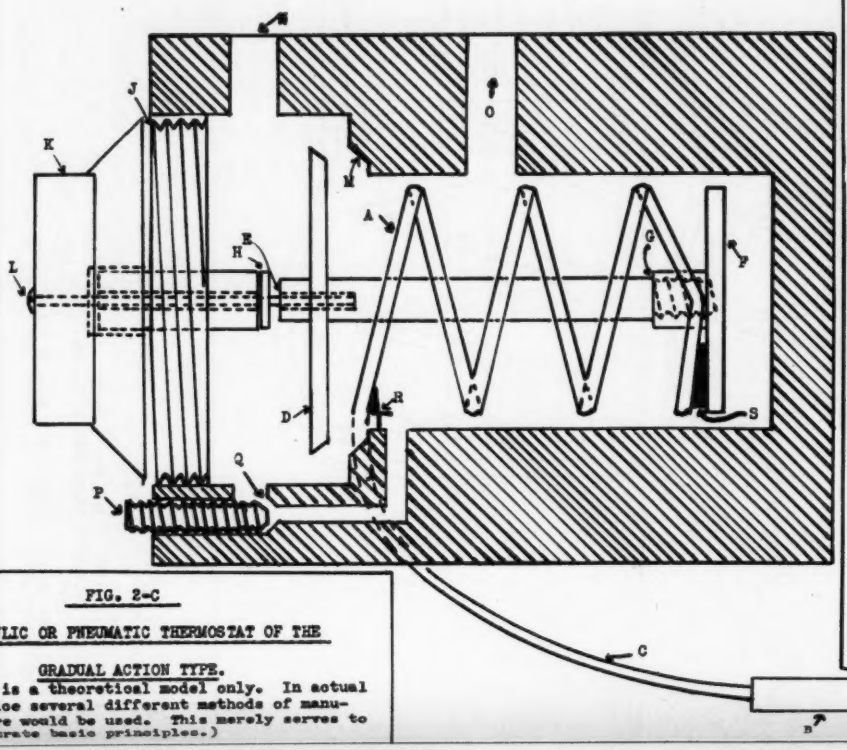


FIG. 2-C

HYDRAULIC OR PNEUMATIC THERMOSTAT OF THE GRADUAL ACTION TYPE.

(This is a theoretical model only. In actual practice several different methods of manufacture would be used. This merely serves to illustrate basic principles.)

wood, Pa., and is unique in that one motion turns the gas fully on, and sets the temperature control.

The model BJ Robertshaw thermostat combines a plug type gas cock with a thermostat. The gas cock handle is combined with the thermostat dial. It is a safety type gas cock and is very flexible as to installation, as the outlet casting can be put in any one of three different positions, and the outlet tapping can be in any one of four different positions. Also, the inlet position can be reversed in four different ways.

The Model BJ has been designed so that the gas cock can be serviced without affecting the calibration or operation of the thermostat. In servicing, the gas cock can be removed and replaced without running any danger of losing or misplacing any parts. It is equipped with the non-clog, non-gum by-pass and pilot valves.

Snap Action or Instantaneous Thermostats. The closing of the valve in a gradual action or throttling thermostat is, just as its name implies, *gradual.* The expansion of matter is gradual and in proportion to the temperature; therefore, if we wish to obtain a thermostat which is instantaneous we must employ some mechanical means whereby an accumulated expansion or contraction is instantaneously transmitted to the valve stem. Such a means is illustrated in Fig. 4, but before we study this let's give a little thought to snap and thermal discs.

Snap and thermal discs, while similar in appearance are entirely different. A snap disc is one in which there is an excess of metal

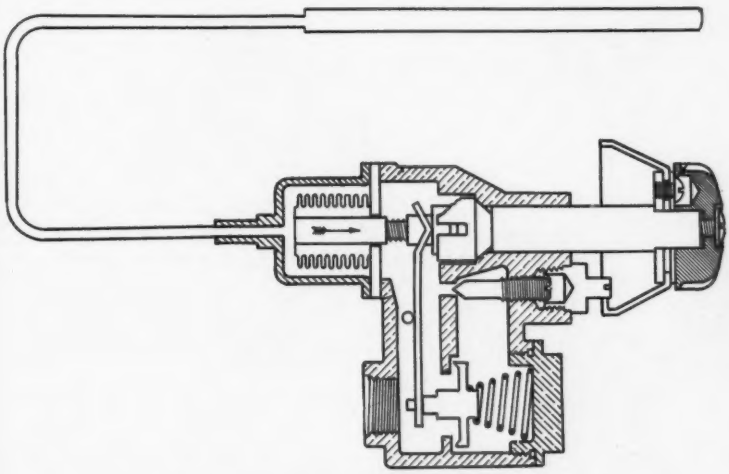


FIG. 3. Wilcolator heat controlling device.

surface within its circumference so that it always remains in either a convex or concave shape—never in a plane. If the disc is in a convex shape, and force is applied to its center so that the center is pressed beyond a point in plane with the circumference of the disc it will snap into a concave position. A good example of this is the bottom of an old tin pie plate which has been distorted by the heat.

Thermal discs are made of two metals with unequal coeficients of expansion. These two discs are either fused or tightly clamped together. Unequal expansion causes the disc to snap into a concave or convex position when heated and vice versa when it is cooled. Some snap action thermostats are made with snap discs and others use thermal discs or levers. The thermostat diagrammatically illustrated in Fig. 4 uses a snap disc.

"A" is a plunger which is caused to travel in the direction of the arrow beneath "A" under the influence of heat. "B" is a shaft loosely threaded into "A" by which the length of "A" can be increased or decreased. Attached to this shaft is lever "C" with its indicating pointer "E" which points to a selective temperature scale on the thermostat housing. "I" is a plunger which passes loosely through the snap disc.

When the thermostat is cold its normal position is as shown and

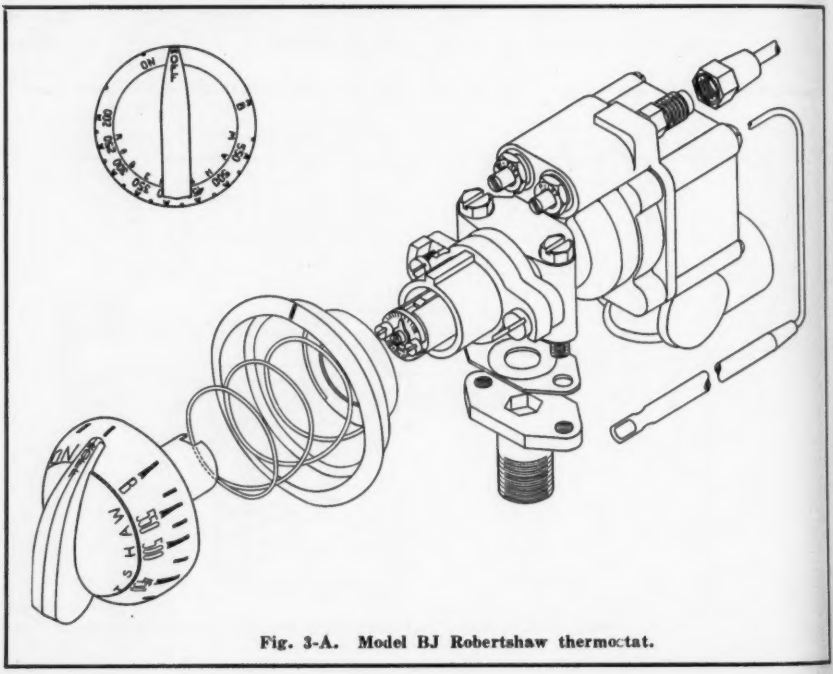


Fig. 3-A. Model BJ Robertshaw thermoctat.

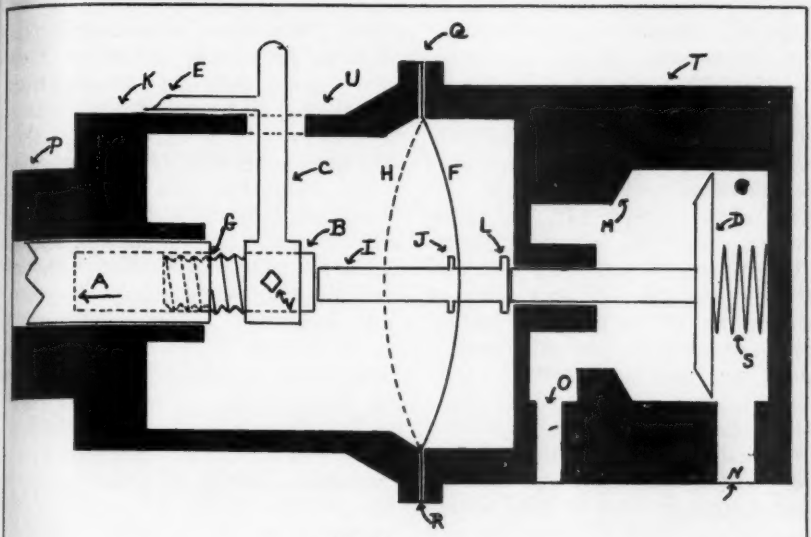


FIG. 4

LEGEND.

A- Bar by which expansion is transmitted to thermostat.
B- Temperature setting and adjusting shaft.
C- Temperature selecting lever.
D- Valve.
E- Temperature selecting arrow.
F- Snap disc in open position.
G- Point where shaft "B" is screwed loosely into bar "A".
H- Snap disc in closed position.
I- Disc actuating plunger.
J- Opening collar on disc actuating plunger.
K- Location of selective temperature scale.
L- Closing collar on disc actuating plunger.
M- Valve seat.
N- Gas inlet.
O- Gas outlet.
P- Collar by which thermostat body is fastened to appliance.
Q- Junction of two housings "T" and "U" between which disc is clamped.
R- Same as "Q".
S- Valve spring.
T- Rear half of thermostat housing.
U- Front half of thermostat housing.
V- Temperature selecting lever set screw.

gas can pass freely in at "N" by the valve "D" and valve seat "M" and then out through "O". Spring "S" keeps the valve stem tightly pressed against plunger "I" and plunger "I" against shaft "B". As "A" travels in the direction of the arrow, valve "D" and plunger "I"

travel in the same direction until collar "L" comes up against the disc, depressing it in the same direction. This movement continues until the center of the disc is depressed beyond the plane of "Q" and "R", at which time it snaps into "H" position and up agianst "J". This allows valve "D" to close against seat "M" instantaneously.

The matter of sufficient clearance between plunger "I" and stem of valve stem "D" is of great importance—otherwise, the thermostat would not function with a snap action in both directions. On some thermostats there is a provision for adjustment at this point. In Fig. 5 we have an illustration of another type of linkage used in snap action thermostats. Here we have two levers, "L" and "R" which rotate on pivot pin "P" within the limits of stop pins "S1," "S2," "S3," and "S4."

The normal position of the levers is as shown in solid lines. When heat is applied to rod "A" it expands in the direction of the arrow, forcing lever "L" into "L2" position against the force of spring "F1." In this position spring "G3" assumes the position "G4" which causes lever "R1" to snap into "R2" position. When this happens valve "D" is closed by the force of spring "U."

As rod "A" cools and contracts it permits lever "L" to return to "L1" position under the force of spring "F2" which now assumes its original position of "F1." Spring "G4" returns to its original "G3" position and in so doing snaps lever "R2" back to its "R1" position, causing valve "D" to open again.

Electrical Thermostats. As distinct from the thermocouple type system, previously described, there are many possible combinations of electrical thermostatic controls available on the market and they are used considerably in connection with industrial gas installations. They are seldom used for the average domestic or commercial installations, consequently the liquefied petroleum gas man only occasionally has need to service them. I suggest that if such an occasion does occur it would be best to get in touch with the company that makes the control, and it will furnish you with the necessary information. Most of these controls have a valve which is opened by the passage of an electric current through an electro magnet, and the valve closes when the current supply to it is interrupted. The functioning of the switch which operates these valves depends upon a thermal unit which expands or contracts with changes in temperature, and calibration is accomplished by an adjustment which changes the distance through which this thermal unit has to travel in order to make an electrical contact. Electrical thermostats are very reliable and are not apt to get out of calibration unless the thermal unit is abused or overheated. Trouble with these units usually traces down to dirty, corroded or pitted contacts or a loose electrical connection.

Diaphragm Valves. Diaphragm valves, when used in connection with thermostats, in the strictest sense of the word cannot be called snap action or instantaneous units,

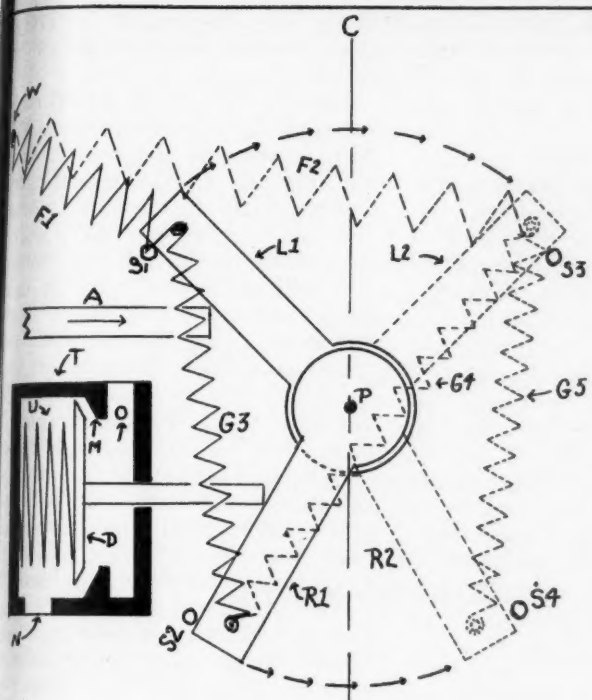


FIG. 5

LEGEND.

A- Plunger which applies expansive force to snap action mechanism.
C- Center line.
D- Valve.
F- Heavy spring. Nos 1 & 2 designate positions.
G- Light spring. Nos 3, 4, & 5 designate positions.
L- Expansion lever. Nos 1 & 2 designate positions.
M- Valve seat.
N- Gas inlet.
O- Gas outlet.
P- Pivot Post.
R- Valve actuating lever. Nos 1 & 2 designate positions.
S1, S2, S3, S4- Stop poles or pins.
T- Thermostat housing.
U- Valve spring.
W- Spring anchor pin.

but they are commonly classed with these thermostats in that they are not of the throttling type, and they positively do cut the burner fully off unless it is desired to also have a low burner flame by

means of a by-pass flame adjustment.. Fully 95% of the trouble with these units comes because of lack of understanding on the part of the service man, so I shall attempt to describe their operation in some detail. They are of particular advantage where large volumes of gas are to be controlled, or where it is necessary to have the main shut-off valve at some distance from the thermal unit.

In Fig. 6 we have an illustration of a diaphragm valve installed in connection with a thermostat on a hot water heater. Gas enters at "I," from which point it goes to the pilot by valve "PV," to the burner for a low flame by valve "LV" and for a high flame through the diaphragm valve. It also goes through the bleeder valve "BV" to the thermostat and then to the bleeder outlet which may be either a separate outlet at "W," as shown, or through the pilot (entering the pilot line beween valve "PV" and the pilot) or to the main burner (entering the low flame line between valve "LV" and the burner.) These last two methods of the disposal of bleeder gas are not, however, recommended.

When thermostat "T" opens, a small amount of gas is allowed to pass through the bleeder line. This relieves the direct pressure from the top of the diaphragm and also allows the direct pressure to open valve "V," thereby allowing a supply of gas to go to the burner. When the thermostat "T" closes, direct pressure then backs up on top of the diaphragm, and as the space below the diaphragm is vented to the burner, this pressure above the diaphragm is greater than the pressure below it and causes the valve to close.

The amount of gas flow through valve "BV" determines the rapidity with which the diaphragm valve will respond to the opening and closing of the thermostat. A small flow through valve "BV" and a large opening through the thermostat will cause the valve to open quickly when the thermostat opens, but it will close slowly when the thermostat closes because of the time required for back pressure to build up above the diaphragm. A large flow of gas through valve "BV" will cause the diaphragm valve to open slowly but to close quickly. The ideal condition is to have the valve operate satisfactorily on just as little flow through valve "BV" as is possible. Normal functioning time for the diaphragm valve is from three to five seconds after the thermostat has opened or closed.

It is possible to use a throttling thermostat in connection with a diaphragm valve by very carefully adjusting all flows of gas in relation to each other, but because of the sensitivity of such adjustments it is not generally considered as being practical in the hands of the layman. For this reason most diaphragm valves are used in connection with a snap action thermostat, thereby causing the valve to function in a positive "on" or "off" manner.

The First Step in Adjusting and Calibrating any Gradual Action Thermostat. Let us turn back to next to the last paragraph of Chap-

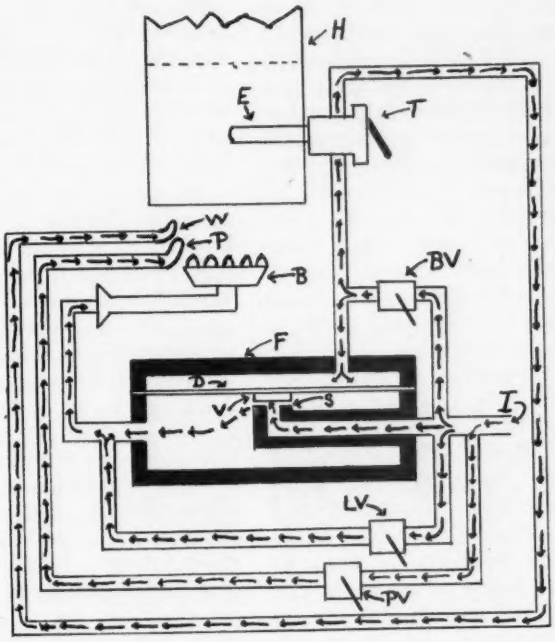


FIG. 6

LEGEND.

BV- Bleeder Valve.
D- Diaphragm.
E- Thermal unit.
F- Diaphragm valve housing.
H- Hot water tank or other gas appliance.
I- Gas inlet.
LV- Low flame by-pass valve for main burner.
P- Pilot flame.
S- Valve seat.
T- Thermostat.
V- Valve unit and weight attached to diaphragm.
W- Bleeder or waste gas discharge. This is sometimes connected into the pilot line or the main burner line beyond the valves LV or PV but this practice is not generally recommended.

ter 9 for a moment, before we start to adjust the thermostat we must adjust the minimum or low flame in accordance with instructions given there. If our minimum flame is too high the oven temperature will creep and it will be impossible for us to adjust or calibrate the thermostat. In my sketch of a primitive rod type throttling thermostat I have purposely omitted the by-pass adjustment, for this may be accomplished by the manufacturer in a number of ways. On the exterior of the body of the thermostat there will usually be found an adjusting screw which permits a small amount of gas to by-pass the valve through a passage communicating with the space above and below the thermostat valve when it is closed. (See parts "O" and "P" in Fig. 2-C.) On some older models this adjustment will be found in the valve itself—there being a tiny hole drilled through it—or an adjustment screw in the valve. On other models there is an exterior by-pass line with an adjustment screw or a fixed orifice in it.

Calibrating and Adjusting Rod Type Thermostats. Because of the variety of these thermostats it is impossible here to give detailed instructions on the adjustment of each thermostat, but we can mention a sufficient number of the general characteristics applying to all of them so that the service man who uses his intelligence can adjust and calibrate all of them. The first thing to note is that *the lower the temperature at which we wish the valve to close the closer it must be to its seat.* Usually this is accomplished by a cap screw in the end of the brass tube. *Caution*—look for a collar with set screws in it, or a set screw in the tube, itself, which is there for the purpose of keeping the cap screw from turning, once the adjustment is set. Be sure to loosen these screws before attempting to move the cap screw, and tighten them again after you have calibrated the thermostat.

If there is no adjusting cap screw at the end of the tube it will be found that calibration is accomplished by turning the tube on its threads in or out of the thermostat head. In doing this is will probably be necessary to use a small Stillson wrench, and extreme care should be used so as not to crush the tubing. Before attempting to move the tube in relation to the body of the thermostat, the lever by which the housewife sets the thermostat to a desired temperature should first be loosened. It will usually be found that this lever is attached to the tubing by means of a collar and set-screw close to the junction of the tubing and the thermostat body.

In calibrating the thermostat, a reliable thermometer should be placed in the oven. After the oven burner has been lighted for about five minutes the thermometer reading should be quickly taken and then the cap screw in the end of the tube or the tube itself turned in the proper direction so that the thermosat cuts the burner flame down to minimum flame at this point. Speed is essential in making this adjustment, and two or three additional tests at higher temperatures must be made in order to

make sure that this initial adjustment is properly made. After this has been done the next step is to set the indicating dial or the indicating arrow in calibration. This is done by taking a thermometer reading and tightening either the dial or the indicating arrow in the proper position. A re-check of this operation at a higher temperature should also be made.

Calibration of Other Types of Gradual Action Thermostats. The calibration of all other gradual action thermostats differs from that applying to rod type thermostats only in the method of accomplishing an increase or decrease in the distance between the valve and its seat. This is usually done by rotating the shaft upon which the indicating dial is fastened, and calibration is accomplished by changing the relationship of the dial to the shaft. In thermostats which use a system of levers to increase the results of thermal expansion, the same thing may be accomplished by movement of the fulcrum or pivot point of the lever.

Calibration of Snap Action and Diaphragm Valve Thermostats. What has been said in the preceeding paragraph applies equally as well to snap action and diaphragm valve thermostats. The chief difference in adjusting these two types is that in the gradual action thermostat the adjustment is made to a complete but gradual closing of the valve at the desired temperature, whereas in the snap action thermostat the adjustment is made to the functioning of the snap-action at the desired temperature, and the valve closes completely and instantaneously at this point.

Service Problems. Other than the matter of by-pass flames and calibration, there are relatively few service problems in connection with thermostats, and these few problems can usually be traced to one of two things—*dirt* or *ignorance.* Thousands of thermostats are returned to the manufacturers every year as being defective, and the real reason for failure does not lie in the thermostat but in the mechanic. A few of the common troubles with the different types of thermostats and the remedy for them are listed in Tables 2, 3 and 4.

I do not claim that these are all the troubles that you will have with thermostats; neither has it been possible for me to completely cover all thermostats. My parting words to you on servicing thermostats are: *"think before you act!"* If you will do this you will never have serious difficulty in repairing and adjusting them.

Selling the Idea of Thermostats to Gas Consumers. A thermostat is *not* a luxury— it is an economic necessity. Operating a gas appliance without one is like driving your automobile with the throttle wide open and changing your speed by slipping the clutch and using the brakes. It can be done, but it is mighty expensive. A thermostat never forgets, it is on the job 24 hours a day, it prevents wasteful over-shooting of temperatures, and controls heat input to a uniformity which it is absolutely impossible for the best operator to duplicate by manual methods. A conservative

TABLE 2. COMMON SERVICE PROBLEMS WITH GRADUAL ACTION THERMOSTATS.

Trouble	*Possible Cause*	*Suggested Remedy*
By-pass flame cannot be cut low enough.	Gas is getting by the by-pass valve.	Clean thoroughly. Lubricate *sparingly* with gas cock lubricant.
	Clearance by the by-pass valve too great.	Plug by-pass and drill a set by-pass through the plugging medium.
		Plug by-pass and install a by-pass with either a set orifice or small capacity valve, around the thermostat.
		Plug by-pass and drill small by-pass hole through the valve or in the thermostat housing between the two sides of the valve.
	Dirt under valve seat.	Clean seat and valve.
	Valve spring too weak.	Install new spring.
	Defective valve or valve seat.	Carefully grind in the valve. Do not grind any more than necessary, use only a very fine compound, and thoroughly clean off compound after grinding.
	Adjusting shaft does not permit valve to close.	Turn adjustment until flame will cut down, then calibrate thermostat.
	Obstruction prevents proper travel of valve stem.	Remove the obstruction.
	Thermal unit defective.	Install new thermal unit.
Burner cuts entirely off, or too low on by-pass flame.	By-pass closed too much.	Adjust.
	By-pass plugged.	Remove obstruction.
High flame will not cut down.	Adjusting shaft does not permit valve to close.	Turn adjusting shaft until flame will cut down, then calibrate thermostat.
	Obstruction prevents proper travel of valve stem.	Remove obstruction.
	Defective valve or seat.	Grind in per instructions given above.

TABLE 2—*Continued*

Trouble	*Possible Cause*	*Suggested Remedy*
High flame will not cut down.	Dirt under valve.	Clean valve and valve seat.
	Defective thermal unit.	Install new thermal unit.
Temperature creeps above setting.	By-pass flame too high.	See remedies listed above.
Temperature cannot be raised sufficiently high.	Burner input too small.	Increase burner input or install new burners.
	Thermostat capacity.	Install correct thermostat.
Burner backflashes on low flame.	By-pass set too low.	Adjust by-pass.
	Burner incorrectly designed.	Correct burner design.
		Install new burner.

TABLE 3. COMMON SERVICE PROBLEMS WITH SNAP ACTION THERMOSTATS

Trouble	*Possible Cause*	*Suggested Remedy*
Burner does not cut entirely off.	Defective valve or seat.	Carefully grind in the valve. (See Table 2.)
	Valve spring too weak.	Install new valve spring.
		Stretch the old spring.
	Friction in snap-action mechanism.	Clean and make sure parts move freely.
	Improper adjustment of snap action mechanism.	Adjust, providing proper clearances.
	Snap action springs too weak.	Install new and stronger springs.
	Thermal disc too weak.	Install new disc.
	Flaw in thermostat housing.	Correct flaw or install new thermostat.
Burner backflashes when thermostat cuts off.	Snap action too slow.	Speed up action by removing cause of retarding friction, or increase tension of snap action springs.
	Valve spring too weak.	Install new spring.
		Stretch the old spring.
	Burner incorrectly designed.	Correct fault in design.
		Install new burner.
Impossible to calibrate.	Defective thermal unit.	Better send thermostat to factory for repairs.

TABLE 4. COMMON SERVICE PROBLEMS WITH BLEEDER TYPE DIAPHRAGM VALVE THERMOSTATS.

Trouble	*Possible Cause*	*Suggested Remedy*
Valve fails to open when the thermostat calls for heat.	Too great a pressure above the diaphragm.	Check for a restriction between the thermostat and bleeder outlet.
		Try cutting down on volume of gas going to thermostat.
		If bleeder gas adjustment is between thermostat and bleeder outlet try increasing amount of gas going to bleeder outlet.
Valve opens slowly when the thermostat calls for heat.	Flow of gas restricted between thermostat and bleeder outlet.	Try removing restriction by adjusting if there is an adjustment between the thermostat and bleeder outlet.
	Too great a flow of gas to the thermostat.	Try cutting down on flow of gas to thermostat.
Burner does not shut off completely when thermostat closes.	Dirt on diaphragm valve seat.	Take apart valve and clean.
	Diaphragm punctured, stiff or defective.	Put in new diaphragm or repair old one.
	Thermostat valve leaks.	Repair as previously described.
	Leak in gas line leading to thermostat.	Repair leak.
Burner does not shut down at all when thermostat closes.	Dirt on diaphragm valve seat.	Take apart valve and clean.
	Diaphragm punctured, stiff or defective.	Put in new diaphragm or repair old one.
	Thermostat defective.	Repair as previously described.
	Bad leak in gas line leading to thermostat.	Repair leak.
	Bleeder line plugged near its inlet to diaphragm valve.	Remove obstruction.
	Bleeder gas supply completely shut off.	Open bleeder valve or remove obstruction.

estimate of gas savings by its use is 15%, and instances of 30% and greater are not uncommon. The first cost of a thermostat is extremely low; it is one instrument which is remarkably trouble free, and it is a wise operator who insists upon it wherever possible.

Enough for tonight—for it is getting late. Let's try the few questions following and the answers which appear on Page 74, to see how much we have absorbed from our discussion of thermostats!

•

Questions on Chapter 10

1. What is the actuating principle of thermostats?
2. What two general types of thermostats are used mostly in the gas industry?
3. Why can a gradual action thermostat control temperature within close ranges more accurately than a snap action thermostat?
4. What advantages belong to the snap action thermostat?
5. When should a diaphragm valve be installed in connection with a snap action thermostat?
6. What is the first adjustment to be made on a gradual action thermostat?
7. What does a creeping oven temperature indicate?
8. What two things are the cause of most thermostat troubles?
9. Name two causes of burners backflashing on low flame.
10. What conservative percentage in fuel consumption may one expect to save by installation of a thermostat?

•

(Chapter 11 of THE BOTTLED GAS MANUAL will appear in the May issue, of BUTANE-PROPANE *News).*

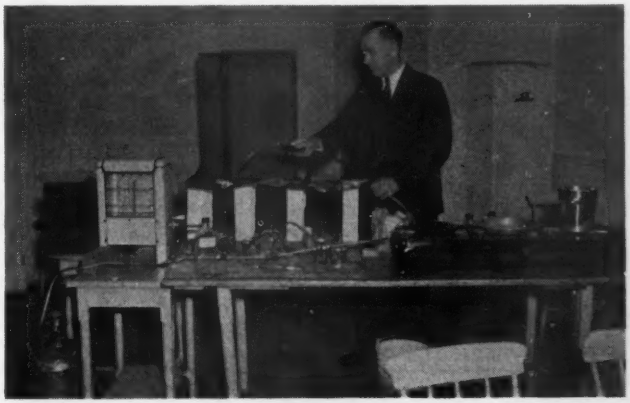
•

Correction to Part 1, Chapter 10, beginning with last word on P. 30 and top of P. 31 (April issue). Equation should read: $1000+[1000\times(110+50)\times.000006]=1000.976$ ft. In other words, its length would increase $0.976\times12=11.712$.

▲

The photograph shows C. C. Turner, author of The Bottled Gas Manual, and recently a lecturer before Maine audiences in the interest of fuel uses and conservation during the war emergency. The improvised laboratory served for stage experiments.

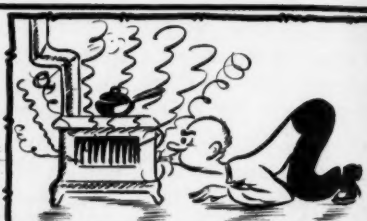
▼



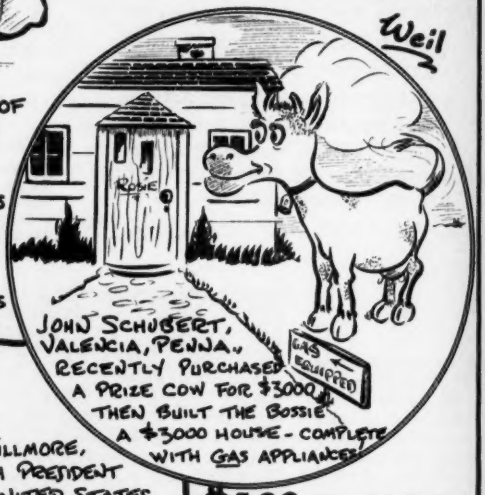
DIDJ'A KNOW

By Weil

IN 1856 THE PEOPLE OF SAN FRANCISCO HAD TO PAY $12.50 PER 1000 CUBIC FEET OF GAS. TODAY SAN FRANCISCANS PAY ONLY 85¢ PER 1000 FOR GAS WHICH IS TWICE AS EFFICIENT - CONTAINING 1180 HEAT UNITS AS AGAINST THE OLD 550.



THE ORIGIN OF THE GAS RANGE HAS BEEN TRACED TO 1820 WHEN ITS INVENTOR, A BRISTOL (ENGLAND) ENGINEER GOT TIRED OF TRYING TO KEEP HIS COAL STOVE BURNING.



JOHN SCHUBERT, VALENCIA, PENNA., RECENTLY PURCHASED A PRIZE COW FOR $3000. THEN BUILT THE BOSSIE A $3000 HOUSE - COMPLETE WITH GAS APPLIANCES.

MILLARD FILLMORE, THIRTEENTH PRESIDENT OF THE UNITED STATES, BOUGHT THE FIRST RANGE FOR THE WHITE HOUSE - BUT BEFORE IT COULD BE USED - HE HAD TO GO TO THE PATENT OFFICE AND STUDY THE MODEL IN ORDER TO TEACH HIS COOK HOW TO USE IT!

$1.00 WILL BE PAID FOR UNUSUAL FACTS ABOUT L.P.G. GAS AND NATURAL GAS AND GAS APPLIANCES WHICH ARE ACCEPTED FOR THIS PAGE. SEND FACTS TO THE EDITOR OF THIS MAGAZINE.

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"WHEREAS, The War Production Board has deemed it necessary and appropriate in the public interest and to promote the war effort to issue a general Limitation Order No. L-86; now, therefore, be it

"RESOLVED, by the Executive Board of Liquefied Petroleum Gas Association, Inc., that it pledge itself and its officers to cooperate with the Government and its agencies in any way in which its services may be utilized, both collectively and individually, to achieve the purposes of the Government in the prosecution of the war, and further be it

"RESOLVED, That it use every effort to obtain the cooperation of all members of the industry so that the resources of the entire Liquefied Petroleum Gas industry may be placed behind the war effort."

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LP GAS INDUSTRY

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Natural Gasoline in the War Will Be Convention Topic

THE 21st annual convention of the Natural Gasoline Association of America will be held May 14-15 in Tulsa, Okla., at the Mayo Hotel and will be devoted largely to a discussion of the position of natural gasoline in the war program with specific reference to special products, transportation, priorities, etc. Committee reports and papers to be read will hold unusal interest at this time for natural gasoline men and those engaged in the liquefied petroleum gas industry. President Ray E. Miller will preside.

WM. F. LOWE

A special feature will be the presentation of the Hanlon award at the banquet on the second evening. This award represents the highest honor of the natural gasoline industry and is presented annually to the one contributing most substantially to the development of the industry.

With registration and technical committee meetings in the morning, the afternoon session will open at 2 o'clock of May 14 with the report of the Gas Testing Committee by H. L. Oder, which will present a revised charcoal testing method and recommendations for reclaiming both charcoal and glycerine.

H. H. Beeson will make the Technical Committee report on the presentation of new standard tables of physical constants for the principal hydrocarbons, a new alternate standard for determining the specific gravity of liquefied petroleum gases by the hydrometer method, and new volume-temperature correction factors for pure liquefied petroleum gases, their mixtures and for natural gasolines.

"Elimination of Errors in Fractional Distillation of Gases," by H. A. Montgomery, covers the results of two years of committee research in which identical gas samples have been exchanged and analyzed by the laboratories of 15 cooperating companies. Recommendations will be presented for changes in both procedure and apparatus.

"The Testing of High Pressure Gases" by C. H. Gee, is a report of the High Pressure Gas Division Technical Committee covering comparative field tests along the Gulf Coast.

The second day's session will include the following papers:

"A Suggested Standard Method for the Measurement of High Pressure Gases" by Dr. Donald L. Katz, University of Michigan.

"The Transportation of Light Gasolines in Crude Oil Pipe Lines," by a speaker yet unannounced.

"The Extraction of Butane," by J. W. Wilson, which will discuss in detail the various methods of obtaining high yields of butane at natural gasoline plants, including technical details, efficiencies, general economics, etc.

During the evening of the first day entertainment for all guests will be provided by the Natural Gasoline Supply Men's Association.

BANKS TANKS DOMINATE

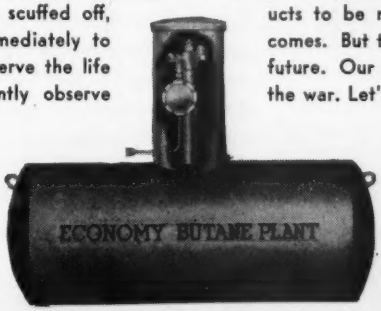
We MUST Conserve To Win!

By W. W. BANKS

You can help to win the war by getting more life out of your equipment and by showing your customers how to get longer life from the equipment purchased from you.

Let's be specific. For an example, consider the transport tank you bought from the Dallas Tank & Welding Company—if the paint becomes scuffed off, repaint that spot immediately to prevent rust and preserve the life of the tank. Frequently observe the condition of the butane hose and keep out the kinks to preserve it from destruction inside. See that the clamp is always tight to avoid losing butane. Rotate your tires for longer life. Instruct your drivers to drive carefully and avoid accidents. These are just a few of the many things you can do to conserve and prolong the life of your own equipment.

Our future in this industry lies ahead. We're thinking of the Big Job that's coming . . . we're already dreaming, thinking and planning designs of products to be marketed when peace comes. But that's reserved for the future. Our big job now is to win the war. Let's get on with the job!



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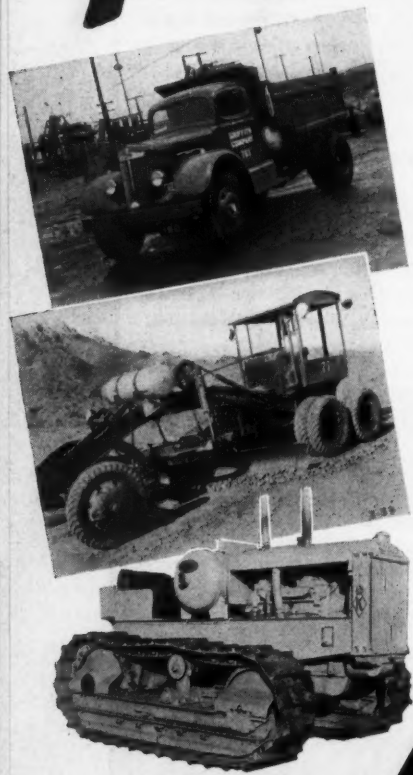

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"FOR logging operations such as ours, I can highly recommend the use of butane for tractors. It is cheap and has great power. The fire hazard in the woods is less. Wear and tear on the engine is reduced to a minimum on account of non-dilution of crankcase oil. Anyone that can operate an old type gas engine can also operate butane equipment; there are no complicated parts to be repaired as is the case with diesel fuel." Thus is summarized the experience of Louis W. Hicks, part owner of the Forbestown Lumber Co., Forbestown, Calif. Others interested are Ben Filer and Mrs. Mary Hicks, widow of Louis' brother.

"Armored" for Logging

About three years ago, The Forbestown Lumber Co. rebuilt and converted a "60" Caterpillar tractor to butane for logging work. It was specially rebuilt and "armored" for this work. The cylinder heads were turned down the required amount to increase the compression. The best type of rings obtainable was used and particular care was taken in adjusting bearings and crankshaft to provide for the extra compression of butane.

In July 1939 the tractor went into service and has seen continuous use during the logging seasons since then except for a short period last fall when it was brought into the shop and completely overhauled. Since the conversion, the tractor has yarded and loaded 4,325,693 board feet of logs at a fuel cost of $564.10, which Mr. Hicks states, is very low fuel cost per thousand feet of lumber.

Two Quarts of Oil Per Week

No exact data was kept on the tractor's oil consumption but it was estimated that the tractor, in good condition, uses approximately two quarts per week until the fluid becomes too thick to flow, which is about once a month. Five gallons is then required for a refill. The best oil obtainable is used and costs the company 54 cents a gallon which is considerably cheaper than diesel engine lubricating oil, according to Mr. Hicks.

Not only has butane cost much less per gallon than the cheapest grade of gasoline obtainable by the

company but according to the company's past experience a saving of about 20 gallons per week over gasoline has been accomplished.

Another appreciable saving since the conversion has resulted from the reduction of fuel stolen by logging crews and outsiders for their cars. Before using butane there was no way of protecting any gasoline that might be left in the tank at the end of the day's work or even while logging operations were in progress. That has all been eliminated by the use of butane. Tanks can be filled and equipment left in the woods over night. A saving of several dollars a week is credited to this advantage of the fuel.

"Drivers of the tractor have noted an increase in power since the machine was converted from gasoline to butane," says Mr. Hicks, "and we do find that the butane driven engine of the same type can handle much larger logs than the old gasoline engines did and also that it takes a much larger diesel tractor to do the same work."

Logging Is Tough Job

The only disadvantages encountered since the conversion are the loss of fuel that occurs when a limb or branch breaks off a fitting and the occasional running out of butane while away from the storage tank. Mr. Hicks states, "Logging, is about the roughest use that a tractor is ever forced to receive, and in spite of our efforts to armor all pipes and fittings we occasionally lose a tank of gas, or part of a tank, from a flying limb or an unseen snag. Seldom does the tractor run out of fuel and these two disadvantages are more than offset by the advantages and the difference in the cost of operation."

In regard to the question, "Is starting more difficult in cold weather?" Mr. Hicks says that if the tractor is in good shape it is not and if the engine is not in good shape is it difficult to start on either gasoline or butane so there is certainly no disadvantage in this respect.

The storage tank has a capacity of 600 gals. and is mounted on two wheels with an attachment for the tractor so that it can be taken to any location in the woods regardless of roads.

◆ ◆

LP-Gas Equipment Company Builds Aircraft Supercharger

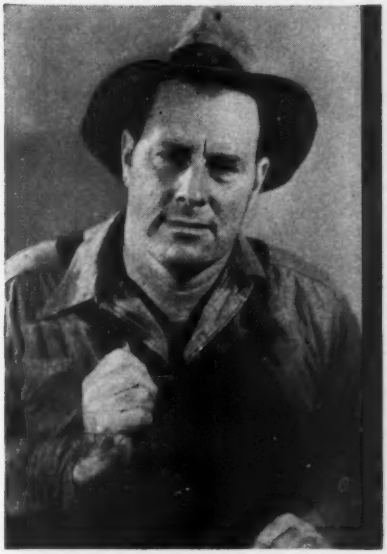
A new company to be known as the Supercharger Corp. has been formed by E. E. Tattersfield, head of Electric and Carburetor Engineering Co., Los Angeles, and his associates Thomas Thickstun and J. A. Cloes. Mr. Tattersfield will be president of the organization, Mr. Thickstun vice-president, and Mr. Cloes secretary-treasurer.

The company will manufacture supercharger equipment used in pressurizing air craft cabins for stratosphere flight. Present production will concentrate on equipment for pursuit fighter class planes operating as high as 40,000 ft. The supercharger for this type of ship is a slow speed, electric driven unit weighing only 21¼ lbs., which is mounted in the cabin of the plane.

It is planned that superchargers for trucks and for the building of gas pressures on equipment in the industrial field will be produced after the war.

Give me a RANSOME PAINT BURNER

Ransome Butane Paint Burners are available for one or two operators, with butane cylinders of various sizes.



—"and I will turn out twice the work with half the effort. Ransome paint torches weigh but one eighth as much as the average quart size gasoline torch—I lose no time in refilling, pumping pressure and generating a gasoline torch. Ransome paint burners operate smoothly and fast—there is less charring and sandpapering. Those are the simple reasons why I turn out more work per day, and can still enjoy an evening's entertainment." Why don't you write for a Ransome catalog today.

RANSOME COMPANY

Designing and Constructing Engineers

4030 HOLLIS STREET · EMERYVILLE, CALIFORNIA

Ransome

REGULATION FROM PLANT TO BURNERS

Reliance Type "RV200" Valves are recommended for installation on the by-pass line of liquid pumps for relieving the set pressure and discharging the excess back to the suction side of the pump. They are also used as differential valves in butane gas plants. Pressure springs are provided for a range of from 5 to 125 pounds.

Reliance Type "ASO" Valves are used for back pressure or relief service up to 5 pounds per square inch and as low as 3" water column. Especially recommended for butane systems.

Reliance Type DV200 Valves are installed for use as differential valves on butane meters to minimize vapor lock. Maximum pressure setting is 225 pounds p. s. i.

Reliance Type "MR" Duplex Regulators reduce extremely high pressures encountered in liquid petroleum gas cylinders when first installed, to a uniform outlet pressure of from 3 to 10 pounds, thereby enabling the secondary type "B" or "BK" regulator to work under efficient service conditions. This installation automatically permits gas to be drawn from one or both cylinders according to the load demand. An indicator shows the condition of the supply at all times.

For description of a complete line of valves and regulators for the liquid petroleum gas industry, from plant to burners, ask for Bulletins 40 and 49.

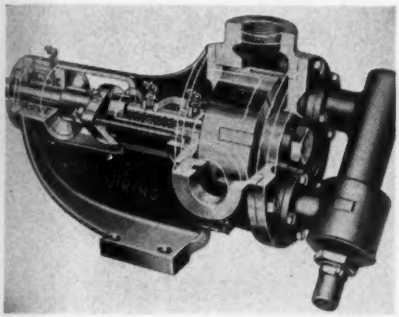
RELIANCE REGULATOR CORPORATION
1000 MERIDIAN AVE., ALHAMBRA, CALIFORNIA

PRODUCTS

Truck Pump

Viking Pump Co., Cedar Falls, Iowa.
Model: K124.

Description: A complete new line of butane and propane handling truck mounting pump units are now being offered. The integral bracket base



has been redesigned with an extra long stuffing box to accept 10 rings of specially treated packing and a bronze lantern ring. Treated gaskets are also used on the head and bracket ends of the casing. Relief valve on head is included as standard equipment. The integral radial thrust controls end play and distortion sometimes experienced in truck mounting installations, states the manufacturer. Unit is available in 35, 50 and 90 GPM sizes. All Viking Butane pumps can be furnished in all iron or bronze fitted construction as desired.

◆ ◆

First Aid Kit

E. D. Bullard Co., 275 Eighth St., San Francisco, Calif.

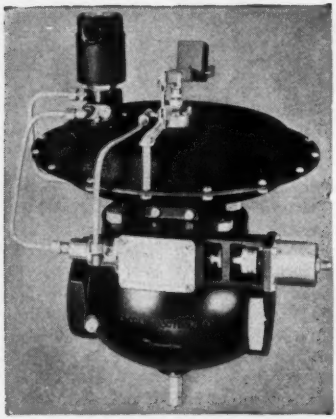
Description: A completely weatherproof first aid kit which is available with mounting bracket that permits the kit to be removed instantly and carried to the injured when necessary. Contents are protected from the weather by a special "weather-strip" rubber tube that also acts as a spring that opens the lid when the fastener is released. Contents are easily removed whether the kit is laying flat or wall-mounted because the sides are lower than the individual packets of treatments, which furnishes plenty of finger room. Inside the lid of each kit is furnished an "Instant Guide to First Aid" which gives the user application instructions and injury diagnosis symptoms. A folder, "A Unit First Aid Plan," is also available.

◆ ◆

Diaphragm Gas Valve

General Controls Co., Glendale, Calif.
Model: Series B-55G.

Description: This diaphragm operated fuel supply valve is electrically piloted and acts to maintain a constant steam pressure at all times by throttling the gas flow and air damper in direct proportion, yet eliminates the "hunting aspect" common to some throttling valves. Another feature of this gas valve is the low fire adjustment which sets the maximum amount of fuel supplied to the burner. The valve has a range of opening speeds adjustable from 20 to 60 seconds. Closing time is fixed, regardless of opening adjustment, ranging from 3 to 6 seconds after electrical circuit is opened. Standard diaphragm sizes (free diameter) are 11 in. on the 1 in. to 1½ in. IPS valve sizes, 13 in. on the 2 in. to 3 in. IPS sizes, and 16 in. on the 4 in. to 6 in. IPS valve sizes. The valve is available



from 1 in. to 6 in. IPS. Gas pressure range: from 2½ in. water column to 5 lbs.; governors available for wide range of steam pressures. Full details may be secured by writing the manufacturer for engineering bulletin E-344.

◆ ◆

Gas Refrigerator

Servel, Inc., Evansville, Ind.

Model: 1942 Servel Electrolux

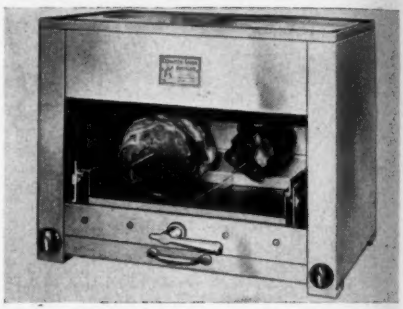
Description: The manufacturer states that the 1942 Servel Electrolux refrigerators feature an attractive, simplified exterior design, and retain all the modern, improved features inaugurated last year to meet the food storage problems of the modern housewife. Maximum flexibility of storage space, increased ice cube capacity, faster freezing of ice cubes and more easily removed ice cube trays, are among the convenience features retained in the new line. Other outstanding features include: Tilt shelves next to the freezing unit, providing extra storage space for small containers, and, when tilted back, extra storage space for unusually tall bottles; the three-position, and the two-position sliding shelves. Also retained are the "dew-drop" vegetable fresheners, controlled humidity for meats, and interchangeable porcelain trays.

Barbecue Broiler

Masterchef Products, Inc., 509 5th Ave., New York City.

Model: RB-2 Counter-Speed

Description: This is a two-spit roto-broiler that roasts, fries, broils, toasts and barbecues. The broiler is easy to clean and the burners and ceramics are self-cleaning and non-carbonizing. An oversize grease drain allows the grease to flow to drip pan in cool zone at base. A raising and lowering device of the broiling rack enables cooking at exact temperatures. Comes with specialty spits for different meats, fish and fowl. Dimensions: width, 22 in.; height, 18 in.; depth, 15 in. Total cooking area, 540 sq. in.



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Liquid Coating for Glass

Roxalin Flexible Finishes, Inc., Elizabeth, N. J.

Model: "Roxaneal" Glass Protector

Description: A new glass protector, water-white, transparent liquid that prevents broken glass from flying. It is not claimed to stop glass from fracturing, but tests have proved that it will keep broken glass in place, thus preventing dangerous glass splinters from flying, states the manufacturer. Roxaneal is applied to the interior of clean glass. Windows may be cleaned with mild soap solutions without affecting the strength of the protective film.

keeping 'em Healthy

ROPER Gas Cookery

Roper gas ranges the nation over are doing their part for Victory—saving food vitamins, minerals, juices—helping keep Americans strong and healthy ★Yes! Roper continues a job started 57 years ago. Today that job is more important than ever.

ROPER A PILLAR OF THE GAS INDUSTRY FOR OVER 57 YEARS

Exclusive Features "Staggered Top" ★ "Glo" Broiler ★ "Peasant-Ware" Grill ★ "Simmer-Speed" Burners ★ "Scientific" Cooking Chart ★ "3-in-1" Oven.

Buy War Bonds

ROPER SPEEDS PRODUCTION FOR DEFENSE

GEO. D. ROPER CORPORATION

GENERAL SALES OFFICES AND PLANT, ROCKFORD, ILLINOIS

Roper gas ranges for all gases including (LP) liquefied petroleum gas

HELP YOUR CUSTOMERS CONSERVE CALORIC GAS RANGES

Because priorities have curtailed production of gas ranges and other home appliances, maintenance and conservation of existing equipment is vital.

Many department, furniture, and home appliance stores are establishing repair and maintenance departments for servicing customers' appliances.

Caloric is prepared to supply replacement parts for all types of Caloric gas ranges. We are also glad to make suggestions for the proper care and adjustment required to prolong the usefulness of the range—and to insure perfect cooking results with all types of L-P gas.

Write for the catalog of Caloric parts—ask us any questions about the servicing of these superior ranges.

CALORIC
GAS RANGES

CALORIC GAS STOVE WORKS • PHILADELPHIA, PA.

RESEARCH

EACH MONTH a competent staff reviews more than 70 publications serving the oil, gas and affiliated industries in a search for those published articles of value to technicians and executives in the liquefied petroleum gas industry. In this department of BUTANE-PROPANE *News*, brief abstracts of such articles are presented.—Editor.

Alkylation—Oil Industry's Contribution to War Requirements of Aviation Fuel—G. B. Murphy. *National Petroleum News*, Jan. 7, 1942. P. R-4, etc. This article presents in a general way the principles of the sulfuric acid alkylation process, in order to allow the average refiner to determine if his company is in a position to install a plant. There has been very little published on this since it was first introduced in the development stage in 1939. The method today assumes great importance for the manufacture of a high octane blending agent for fighting grade aviation fuel, and the government has recommended that the process be standardized and offered to all refiners on a reduced royalty basis. This article discusses the principles of chemistry involved, plant operating conditions, general requirements for charging stocks and installation and operating costs briefly. The summary gives general data on capacities, yields, operations and quality of the finished product, although actual data from individual operating plants are not available.

Sufficient Butane Can Be Made Available for Synthetic Rubber—W. L. Nelson. *Oil and Gas Journal.*, Jan. 29, 1942, pp. 199, 200. Most of the butadiene and butenes required for the production of synthetic rubber can be made in the same plants that are being built for 100-octane gasoline production—and in these plants the butadiene normally would have been a byproduct waste. About 7,000-13,000 bbl. per day of these materials may be required. Likewise, another primary constituent, styrene, is a byproduct of the distillation of coal tar. Perhaps 1,000-4,000 bbl. of styrene will suffice. Two types of synthetic rubber, i.e., Buna S and Butyl rubber, appear to be most satisfactory, although synthetics of many types and exhibiting many different properties are possible. After complete development, the properties of these rubbers will probably be superior to those of natural rubber and the cost will not be much greater. It is probable that natural rubber will eventually be considered as a cheap inferior product.

War-Time Protection of Industrial Plants. *Chemical & Metallurgical Engineering*, Jan., 1942, pp. 102-108. Sabotage by fire is the most dangerous of all war-time enemies of American chemical and process industries. Fortunately, protection against such damage can be had by strict adherence to orthodox methods of fire prevention, although it will be necessary to double and triple normal peace-time measures. Common sense and stern precautionary steps are the best protections against all types of sabotage and espionage of industrial chemical and process plants. Enemy air raids may consist of efforts to cripple or destroy certain industrial plants by the use of incendiary bombs. Magnesium incendiaries are relatively harmless if properly understood and fought. A fine spray of water can quickly extinguish them and prevent damage in most cases. However, it is first necessary to have proper equipment in sufficient quantities, properly trained personnel and many sources of water in order to fight such bombs successfully. Reasonable protection of equipment and personnel from dis-

tant effects of high explosive bombs can usually be obtained from light weight shutters and other simple methods. Blackouts can best be accomplished by the use of proper screens or baffles, although most plants require individual study before protective steps are taken.

Code for Pressure Piping—Sabin Crocker. *Heating, Piping and Air Conditioning*, Jan., 1942, pp. 1-5. Part 1. Since the ASA code for pressure piping was first issued as a tentative standard six years ago, there have been many developments and advances in piping practices. Welded joints have assumed increasing importance, standard dimensions for various types of fittings have been established and have come into common use, new rules and qualification tests have been formulated, and refrigeration piping has developed because of the growth of air conditioning and the older refrigerating applications. These and other factors have been among the changes which ASA sectional committee B31 has considered and incorporated in the new draft of the code for pressure piping in order to keep it abreast of the times. In this group of articles the new code, which soon will be a full American standard, is described and discussed in detail.

Petroleum's Past, Present and Future—R. P. Russell. *Chemical & Metallurgical Engineering*, Jan., 1942, pp. 84, 85. This article contrasts petroleum, from a tonnage basis, with some of the other industries so often regarded as outstanding examples of American mass production methods. Chemical engineers will be interested in seeing how favorably this great process industry compares with those in which mechanical operations largely predominate. The answer is found in the former's dependence upon research and engineering development.

Gains in Oil and Gas Production, *Refining and Utilization Technology*, by H. C. Miller and G. B. Shea. Tech. Paper 3, National Resources Planning Board.

Dew-Point Recorder Protects Gas Line from Freezing—J. A. Setter. *Oil Weekly*, Jan. 5, 1942, p. 33. To prevent condensation of moisture and possible freezing of its gas lines during the winter months, Colorado Interstate Gas Co., which furnishes Denver with natural gas from Texas fields, has built a novel dew-point recorder utilizing a photo-electric relay. This equipment consists of a small tank filled with anti-freeze solution into which is immersed a U-shaped highly polished gold-plated tube. Through this tube passes a continuous flow of natural gas from a by-pass valve in the main pipe line. Both ends of the tube are provided with plate-glass windows. Above the windows, a light source and a photo-electric relay are mounted so that the light shines through the tube and is reflected to the phototube. Illustrated.

A Work-Week Plan for Chemical Industry—R. R. Lyman and D. F. Othmer. *Chemical & Metallurgical Engineering*, Jan., 1942, pp. 86, 87. With the labor situation steadily becoming more complicated by federal and state laws, and in view of Washington's call for doubled and quadrupled production of war materials the Gray system of scheduling continuous shift work is now worth special consideration. This progressive rotation system for four shifts on a 32-hour cycle and a 168-hour work week has stood the test for four years continuous use and comparison by actual operation with numerous schemes. The authors state that none approach it in advantages.

Elements of Orifice Meter Operation and Maintenance—J. W. J. Bercher. *Petroleum Engineer*, Dec., 1941, pp. 44, etc. Part 2. Part 1 in November issue.

Molecular Explanation of Retrograde Condensation—R. F. Nielsen. *Oil Weekly*, Jan. 5, 1942, pp. 28, etc. It is conceded as a fact that there are certain attractive forces between molecules. The molecular explanation of retrograde condensation, as given in this article, is based on such forces.

70 YEARS' EXPERIENCE

an asset that spells security!

Let **FLORENCE** *do your Cooking*

Florence has been in business since 1872. We have learned a lot in that time—you have to, to stay in business for 70 years!

We've learned what millions of American women want most in their cooking . . . how to build consistently better ranges year after year. We've learned how to give your customers increasingly better, easier cooking . . . how to give *you* more and more to offer in Florence Ranges for L-P gas.

Through the years, the name "Florence" has become a symbol for the best there is in cooking! Our technicians are working *now* to give you even better Florence Ranges to sell tomorrow—to create new and better opportunities for you as a Florence dealer.

Remember that 70 years of experience put a firm foundation under your future.

★ ★ ★

Florence Serves for Victory—Florence workers are busy filling important Army and Navy contracts. This is in addition to supplying Florence Ranges and Heaters for Defense Housing projects.

FLORENCE GAS RANGES

For L·P Gas

BACKED BY 70 YEARS' EXPERIENCE

FLORENCE STOVE COMPANY: Gardner, Mass.; Kankakee, Ill.; 1459 Merchandise Mart, Chicago; 45 E. 17th Street, New York; 53 Alabama Street, S. W., Atlanta; 301 N. Market Street, Dallas; and 2730—16th Street, San Francisco.

Joseph H. Lane Elected President of Cavalier

Joseph H. Lane was elected president of Cavalier Corp., manufacturers of gas ranges, at the annual meeting of that organization in Chattanooga in mid-February. G. C. Raoul, president for many years, became chairman of the board of directors.

Mr. Lane joined Cavalier Corp. after graduating from Dartmouth College in 1921, as a salesman, and covered the New England territory. He became, successively, advertising manager, one of six assistant sales managers, gradually assuming the duties of the five other assistants, sales manager, and then vice president.

Mr. Raoul and Mr. Lane will continue with their previous duties for the present, with Robert T. Frazier, vice president in charge of sales and production for the appliance division. Mr. Frazier is president of the Institute of Cooking and Heating Appliance Manufacturers, serving his second term.

◆ ◆

Production of LP-Gas Increases In January

WASHINGTON, March 28.—Daily average production of natural gasoline, recycle condensate and liquefied petroleum gas, at natural gasoline and recycling plants, amounted to 10,140,000 gallons during January, the U. S. Bureau of Mines reports.

The January production report is the first compiled by the bureau that includes all the liquefied petroleum gas made at plants.

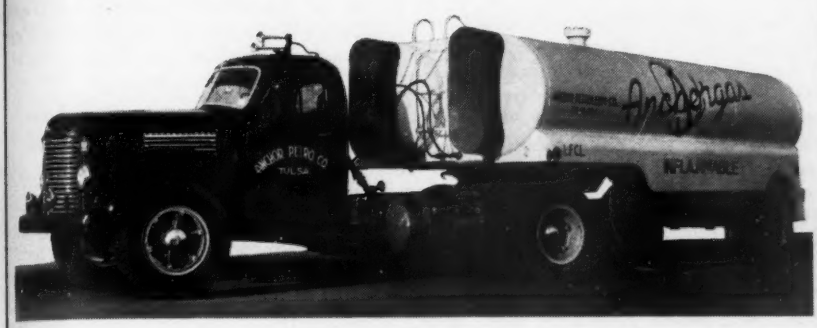
Stocks of products at the close of January amounted to 201,684,000 gallons, compared with 179,550,000 gallons on Dec. 31.

McNamar L. P. G. Transport built for Anchor Petroleum Company. Stronger, lighter weight tanks carry higher ratio of pay load. Faster loading and unloading. Transports of 2,500 to 4,500 gallon capacities. All tanks A.S.M.E. U-69.

Pressure storage vessel for Anchor Gasoline Corp., Eola, La., plant. We build vessels for natural gasoline, Butane, Iso Butane mixtures and Propane. API-ASME or ASME U-69 construction.

McNAMAR BOILER & TANK COMPANY

TULSA, OKLA. SALEM, ILL.



Anchorgas

In cooperation with the war program, ANCHOR inaugurates truck transport facilities to release tank cars for National Defense efforts.

Expansion in this field is in keeping with ANCHOR'S complete service to its customers.

BUTANE-PROPANE

ANCHOR
PETROLEUM COMPANY
Atlas Life Bldg. Tulsa, Okla.

LP-Gas Association Opens Office in Washington, D. C.

The Liquefied Petroleum Gas Association, Inc., 11 West 42nd St., New York, has opened an office in the Hibbs Building, 725 15th St., N.W., Washington, D. C., to facilitate the functioning of the Association in connection with national affairs, according to an announcement by F. R. Fetherston, secretary. The telephone number is Executive 1740.

The office, in addition to handling certain contact work of the Association, will assist members who have problems in Washington, or who are visiting Washington and would like to take advantage of its facilities. LP-Gas gas industry visitors are advised to keep the office informed concerning their arrival in Washington, and where they can be reached while there.

The Washington office will be supervised directly from New York and a copy of all correspondence to Washington should be sent to the New York office to facilitate handling.

◆ ◆

A.G.A. Provides Gas Industry With War Protection Manual

"War Protection of the Gas Industry" is the title of a looseleaf book whichhas been published by the American Gas Association and made available to those having the responsibility of protecting gas plants throughout the country.

The American Gas Association has prepared this basic material on gas industry defense to provide a comprehensive source of information on protection of property and personnel, and the repair of damage caused by air raids and other attacks.

It constitutes a correlation of the experience of England, Germany, and other countries with the needs of America, and is divided into two parts. The first is "Protection Against Enemy Action," and the second is "Emergency Procedures." It incorporates plans for organization, coopertion with civilian defense authorities, and training of crews.

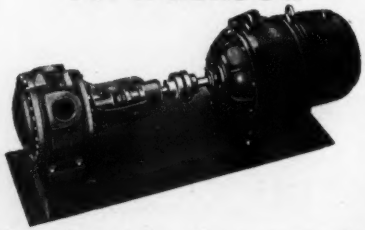
◆ ◆

Howard C. Clark Enlists In U. S. Naval Reserves

Howard C. Clark, of the American Gas Association Testing Laboratories, Cleveland, Ohio, resigned April 15 to enlist in the United States Naval Reserves. He will be stationed at Notre Dame for six weeks. After which he will be sent to an engineering school or placed on a battleship to complete his preliminary training for rank of ensign.

Mr. Clark is the sixteenth engineer to leave the Laboratories for service in the armed forces of our country.

BALANCED
For A REASON



The exclusive balanced gear construction of Smith Butane-Propane Pumps solves the problem of handling non-lubricating fluids. This construction plus precision workmanship guarantees the exceptional service and long life experienced by our customers. Send for data sheets giving complete information on this exclusive principle.

SMITH PRECISION PRODUCTS CO.
1135 Mission St., South Pasadena, Calif.

TO ALL

Natural Gasoline Men

Greetings

from the

NATURAL GASOLINE SUPPLY MEN'S ASSOCIATION

We are looking forward to seeing you
at the

TWENTY-FIRST ANNUAL CONVENTION

of the

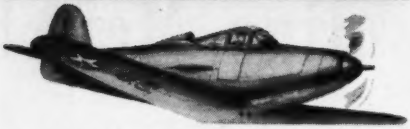
**NATURAL GASOLINE ASSOCIATION
OF AMERICA**

May 14-15, Mayo Hotel, Tulsa, Oklahoma

MEMBERS OF THE NATURAL GASOLINE SUPPLY MEN'S ASSOCIATION

The American Rolling Mill Company
The Bristol Company
The Brown Instrument Company
BUTANE-PROPANE News
Chaplin Fulton Manufacturing Company
Chicago Bridge & Iron Company
Clark Brothers Company
Continental Supply Company
Cooper Bessemer Corporation
Joseph A. Coy Company
W. H. Curtin & Co.
The Fisher Governor Company
The Foxboro Company
Frick-Reid Supply Corporation
Gasoline Plant Construction Corporation
Goulds Pumps, Inc.
D. W. Haering & Co., Inc.
Hanlon-Waters, Inc.
Hercules Motors Corporation
Ingersoll-Rand Company
Warner Lewis Company
Mason-Neilan Regulator Company
C. A. Mathey Machine Works
Mid-Continent Engineering Company
Merco-Nordstrom Valve Company
Metric Metal Works
Midwest Piping & Supply Company
Moorlane Company
National Petroleum News
National Tank Company
Naylor Pipe Company
The Oil & Gas Journal
The Petroleum Engineer
Petroleum Engineering, Inc.
Pittsburgh Equitable Meter Company
The Refiner and Natural Gasoline Mfr.
The Refinery Supply Company
Taylor Instrument Companies
Tulsa Boiler & Machinery Company
Vinson Supply Company
Walco Engineering & Construction Company
Westcott & Greis, Inc.
Woobank Pump & Machinery Company
Worthington Pump & Machinery Company
Wyatt Metal & Boiler Works
John Zink Company

Cavalier's Materials Are Going to War!



The modern design of today's gas ranges requires large amounts of steel and other materials which are not available in sufficient quantities to care for consumer demand after war needs are supplied. The materials Cavalier would have had are going to war. Furthermore, Cavalier's production facilities are being devoted to the manufacture of munitions themselves, to a constantly increasing extent.

Consequently there will be less Cavalier Gas Ranges in 1942. Our first duty—like yours—is to do anything in our power to further the drive for Victory. Business as usual is out for the duration, but some future day will bring a greater demand than ever before for gas ranges. When that day comes Cavalier will be ready.

CAVALIER *Cool-Kitchen* RANGES

Cavalier
GAS RANGES
CAVALIER CORPORATION
345 W. First St.
Chattanooga, Tenn.

Scaife Directors Elect New Company Officers

R. W. THRASHER

At a recent directors' meeting of Scaife, Co., Oakmont, Pa., the following new officers were elected: A. V. Murray, for the past several years secretary of the company, was made executive vice president; R. G. Taylor was elected secretary, and R. W. Thrasher named new plant superintendent.

Other officers include J. V. Scaife, Jr., president; A. M. Scaife, vice president; R. E. Cecil, vice president sales; J. T. Stuart, treasurer and E. S. Sedlachek, general sales manager.

◆ ◆

Texas Railroad Commission Cautions LP-Gas Operators

Certain law violations in the liquefied petroleum gas industry in Texas were recently called to the attention of all operators of transport units, refineries, wholesalers and all who sell LP-Gas to transporters in that state by the Railroad Commission in a letter signed by Herman Jones, Director.

Owners and operators were urged to make certain that all transport units were operating with proper drag chains and properly functioning valves. Mr. Jones also asked that all operators carry a truck tank identification card, showing the Division's approval and that sellers of LP-Gas refuse to place gas in a unit unless the operator produces this evidence showing approval by the Texas Railroad Commission.

INDUSTRY ANSWERS THE CALL!

32,145 FIRMS WITH MORE THAN 17,700,000 EMPLOYEES HAVE INSTALLED THE PAY-ROLL SAVINGS PLAN

Have YOU Started the Pay-Roll Savings Plan in YOUR Company?

Like a strong, healthy wind, the Pay-Roll Savings Plan is sweeping America! Already more than 32,145 firms, large and small, have adopted the Plan, with a total of over seventeen million employees—and the number is swelling hourly.

But time is short! **The best and quickest way to raise urgently needed billions of dollars is by giving *every* American wage earner a chance to participate in the regular, systematic purchase of Defense Bonds.**

Do *your* part by installing the Pay-Roll Savings Plan now.

For full facts and samples of free literature, write Treasury Department, Section C, 709 Twelfth St., NW., Washington, D. C.

MAKE EVERY PAY DAY . . . BOND DAY

This space is a contribution to Victory by

BUTANE-PROPANE News

U. S. Defense BONDS ★ STAMPS

ROBERTSHAW MANUALS
will help increase your sales

FOR DOMESTIC SALESMEN
"More Income from Gas Ranges"
How can your salesmen sell more gas ranges? This manual shows simply, graphically, convincingly. Thousands of salesmen have greeted it with enthusiasm, are putting it to effective use.

FOR COMMERCIAL SALESMEN
"Hidden Losses in Your Kitchen and How to Stop Them"
The latest developments in commercial gas cooking equipment are brought together in this manual, now used by many bottled gas dealers.

Write for free copies

ROBERTSHAW THERMOSTAT COMPANY
YOUNGWOOD, PA.

Order These Famous L. P. Gas Products From Us . . . .

REGO LP GAS
The BASTIAN-BLESSING Co.
THE DAYTON-DOWD CO.
Hackney
BUTANE PROPANE CYLINDERS
L.C. RONEY INC.
The IMPERIAL BRASS MFG. CO.

GAS EQUIPMENT CO., INC.
2620 South Ervay Street, Dallas, Texas
GAS EQUIPMENT SUPPLY CO.
1157 West Peachtree Street, Atlanta, Georgia

Vertical Storage Features Station

"A SERVICE station for trucks as fine as cars have ever enjoyed." That is the slogan behind Los Angeles' newest butane dispensing station, opened early in March by Frank Sheldon, at the corner of Olympic and Alameda streets.

Butane is only a part of the service Sheldon offers. Gasoline, diesel and complete servicing are available 24 hours a day to truck operators working in and out of Los Angeles. All products handled at the station are those of the Standard Oil Co. of Calif.

By far the most spectacular feature of the new station, the butane storage and dispensing equipment attracts the eye of every passerby. The glistening 4000 gal., vertical tank, more than 40 ft. high, is located near the dispensing island at one end of the station's large lot.

Built to conform to every specification of the Los Angeles' fire department regulations, the butane dispensing system is said to be one of the finest and most modern ever constructed. It is possible that it may serve as a pattern for future butane stations.

The aboveground installation of the storage tank was due to a new recommendation by the city fire department. The vertical tank also conserves space, an important factor in metropolitan areas.

A strong wire fence has been built completely around the base of

EAK-PROOF
UNDER PRESSURE

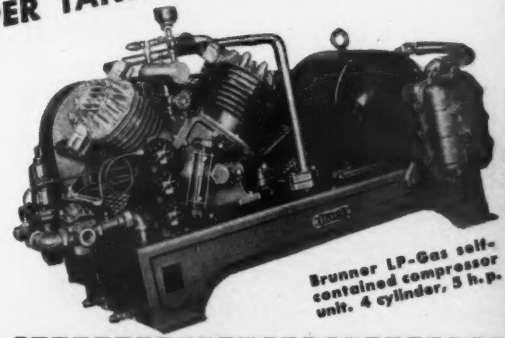
Rochester Criterion Gauges because of their *patented, leak-proof* type of construction are capable of withstanding up to 2000 lbs. pressure thus assuring that *extra margin of safety* so essential in the handling of liquefied petroleum products. Guaranteed accurate and listed as Standard by Underwriters' Laboratories.

Rochester Mfg. Co., Inc., 12 Rockwood St., Rochester, N. Y.

ROCHESTER *Criterion* GAUGES

ARE YOU LOSING
500 to 1000 lbs. LP-Gas Vapors
PER TANK CAR UNLOADED?

Many LP-Gas operators are losing 500 to 1000 lbs. of liquid petroleum gas because they can't recover all the gas vapors in tank car unloading. You can get these additional vapors by using the Brunner LP-Gas compressor unit. These vapor savings will quickly pay for the Brunner unit. Besides, the Brunner compressor will reduce the time required for unloading and speed up bottle filling by as much as 25%. Brunner Manufacturing Company, Utica, New York, U. S. A.



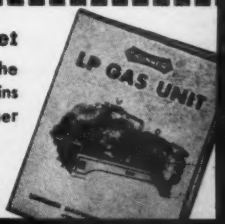
Brunner LP-Gas self-contained compressor unit. 4 cylinder, 5 h.p.

BRUNNER

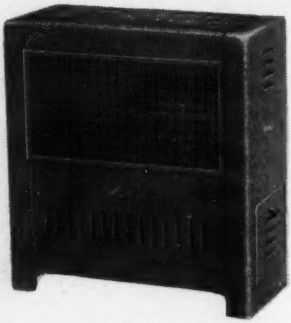
FOR OVER 30 YEARS THE SYMBOL OF QUALITY

Write for FREE Booklet

The new booklet describes the Brunner LP-Gas Unit, contains illustrations, diagrams and other pertinent facts on handling liquid petroleum gas.



L-P CIRCULATORS



Write today for Catalog and prices of the BRILLIANT FIRE line of High Efficiency Gas Circulating Heaters.

The OHIO FOUNDRY
& MANUFACTURING CO.
Steubenville, Ohio

BUTANE
PROPANE

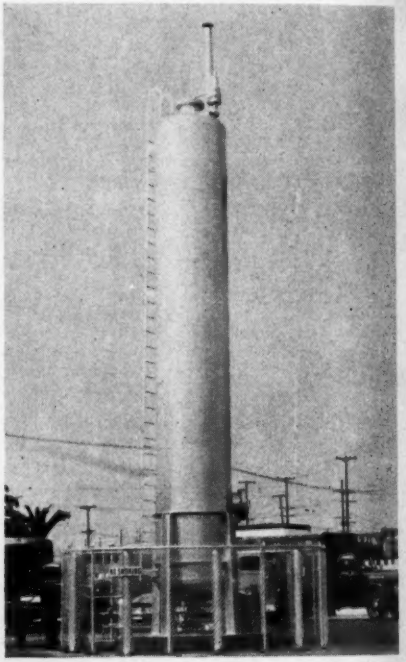
for all requirements— A superior quality assured. Delivery by rail or truck transport.

Clute Petroleum Company
National Bank of Tulsa Bldg.
Tulsa, Okla.

the tank, protecting all intake and outlet lines, pump and other mechanism. A strong guard rail has also been constructed on the side next to the dispensing island.

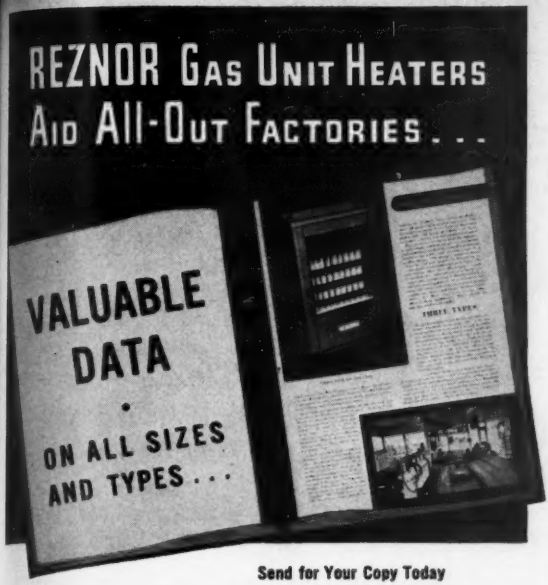
Two Tokheim dispensing units, manufactured by the Tokheim Oil Tank and Pump Co., have been installed on the island, making it possible to service two trucks at the same time. All underground piping extending to the island has been welded in compliance with code rules.

Also conforming to Los Angeles regulations, steel valves are used



This new type vertical butane storage tank dominates the Frank Sheldon truck service station at Alameda and Olympic Blvds., Los Angeles.

REZNOR GAS UNIT HEATERS AID ALL-OUT FACTORIES . . .



Send for Your Copy Today

This interesting Reznor catalog illustrates a wide variety of unit heater installations. A master form for writing specifications is enclosed. In addition, the catalog provides worth-while mechanical data for fan, blower, and duct types which are manufactured by Reznor in a complete range of sizes. Reznor units are rapidly installed, and provide 89% savings in vital materials compared to cast radiation systems. . . . Write for catalog U 42 today.

Reznor Manufacturing Co.
304 James St., Mercer, Penna.

"GAS HEATERS EXCLUSIVELY SINCE 1888"

Why A-212?

"At Downingtown, it has been determined that while this steel costs more; requires knowledge and experience to fabricate, it is to the advantage of buyers of Propane storage tanks to use it.

PROPANE TANKS
for underground and above ground storage

Propane storage tanks at Downingtown are welded in accordance with Par. U-69 of the A. S. M. E. Unfired Pressure Vessel Code.

DOWNINGTOWN IRON WORKS
DOWNINGTOWN, PA.
WELDED and RIVETED PRODUCTS

SPRAGUE METERS

for

PROPANE - BUTANE SERVICE

•

Write for Particulars

SPRAGUE METER COMPANY

Bridgeport, Conn.
Los Angeles, Calif.
San Francisco, Calif.

THOMAS

Double Duty

HAND TRUCKS

At last . . . an all purpose, one man truck for moving both cylinders and appliances. No more back breaking lifting, either.

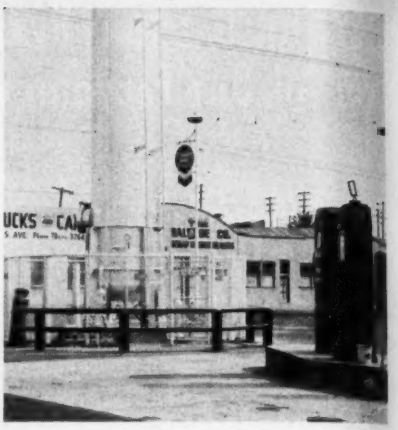
Tapered body gives operator ample room between handles. Cradle construction accommodates any size cylinder up to 100 pound capacity. Wide Bottom flanges give support for appliances. Web strap (optional) holds appliance rigidly.

Rounded handle grips permit skidding from end of delivery truck. A time saving, labor saving, cost cutting truck.

Write for prices and descriptive folder.

THOMAS TRUCK and CASTER CO.

552 Mississippi River
Keokuk, Iowa



Storage and dispensing system are fully protected against damage by trucks. Service is convenient and fast.

throughout. The piping circuit is so arranged that the pump may be used to unload fuel from the tank truck as well as pump the fuel to the dispensing unit. The pump used for this work is a Smith Model 200, manufactured by the Smith Precision Products Co. It has a capacity of 50 gals. per min.

Engineering and construction on the system was done by employes of the Standard Oil Co. Parkhill-Wade, of Los Angeles, assisted in the piping and final hook-up of the system.

◆ ◆

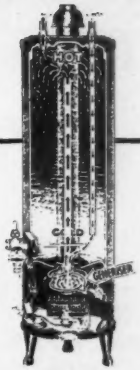
E. A. Stratman Joines Staff Of Waukesha Motor Co.

E. A. Stratman, formerly sales engineer for the Ensign Carburetor Co., of Huntington Park, Calif., is now with the Waukesha Motor Co.

Mr. Stratman will be employed in both sales and engineering work at the company's Pacific Coast branch located in Huntington Park.

Feature for Feature...

THE BEST WATER HEATERS IN EVERY PRICE CLASS!



Manufactured in every size and price range, General Water Heaters build load and good will everywhere they're sold. Every unit backed by *liberal and truthful guarantees.* Be SPECIFIC—Recommend GENERALS!

L.P. General

WATER HEATERS

SPECIFICALLY MADE FOR BOTTLED GASES

General Water Heater Corp., 7 East Cypress Avenue, Burbank, Calif.
San Francisco • Detroit • Kansas City • Dallas • Houston • Memphis

DISTRIBUTED IN PRINCIPAL CITIES THROUGHOUT THE NATION

Warren LP-Gas

To Our Customers,
And The LP Gas Industry

Warren is now serving the needs of our Victory Program, and we know you will agree that our efforts in this direction must come first.

We are also doing everything in our power to help our established customers through the emergency.

At the same time, we are giving every consideration to plans for the future when normal conditions again prevail.

WARREN PETROLEUM CORPORATION
Tulsa, Oklahoma

Texas Regional Groups Form Permanent Association

By CRAIG ESPY

THE Texas Liquefied Petroleum Gas Association, Inc., was officially launched at Waco, Tex., April 9 with the election of J. H. Winton, Winton Automatic Gas Co., Beaumont, president, R. L. Edwards, Edwards Gas Appliance Co., San Antonio, vice president, and E. C. Andrews, Andrews Box Riviere Co., Tyler, secretary-treasurer, and with the adoption of the constitution and by-laws. Felix Shaw was appointed executive secretary by the executive board. Headquarters of the Association are being set-up at Austin, Texas. Directors and board members from eight regional districts in the state, whose names are given elsewhere, participated in making final plans for the State group.

When Meetings Will Occur

Under the constitution the executive board will hold quarterly meetings at Austin and the board of directors will hold semi-annual meetings at the same point. Each regional district elects from its active members a board of directors of five or more members. This board elects its chairman, vice chairman and secretary-treasurer. The State board of directors is made up of two members from each regional group. The board of directors elects the executive board, made up of one director from each regional district.

Class A members of the Association will be licensed and authorized retail liquefied petroleum gas dealers. Only active members will vote or hold office. The dues of the active members are $25 per annum and an additional $10 per annum on each and every fuel truck over one which exceeds 400 water gallon capacity.

Associate members Class B-1 includes manufacturers of liquefied petroleum gas storage and dispensing systems. The dues for this group are $250 per annum.

Associate members Class B-2, engaged in the transportation of liquefied petroleum gas fuel, will pay dues of $100. Another group in this classification, those engaged in the refining or production of LP-Gas will pay dues of $250. Associate members Class C-1, the manufacturer or distributor of liquefied petroleum gas appliances or utilization equipment will pay dues of $25. Associate members, Class C-2, which includes retail dealers of LP-Gas systems of utilization equipment will pay dues of $10 per annum. Class D, honorary membership, will be conferred on the basis of honorary merit and will pay no dues.

The board of directors is composed of Emory S. Kelley, W. G.

For a More DEPENDABLE SOURCE of SUPPLY . . .

. . . of Higher Quality Butane and Propane—for a Stable and More Uniform Product—assuring the utmost in satisfaction and efficient, trouble-free service— try Carter Better Products.

For complete information concerning Carter's dependable service write: The Carter Oil Company, Marketing Department, Room 928 National Bank of Tulsa Building, Tulsa, Okla.

DEHYDRATED

Propane and Butane

THE CARTER OIL COMPANY

TULSA, OKLAHOMA

Shipping Points: Seminole, Okla., Stonewall, Okla., St. Elmo, Ill.

WHOLESALE ONLY!

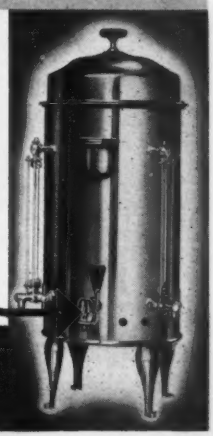
CONSERVATION *for Victory!*

SHOW YOUR CUSTOMERS HOW TO MAKE THEIR URNS LAST

PREVENT LEAKING FAUCETS . . . *Clean them regularly*

Restriction of the supply of metals for the manufacture of coffee urns for civilian use make it imperative that proper precautions be observed in the care of existing urns. Those of your customers who are fortunate enough to own long-lasting Blickman urns are now deriving the benefits of sound construction through efficient, economical and trouble-free operation. The necessity for replacements is reduced to a minimum—thus helping Uncle Sam in his war effort and helping you to consolidate customer good-will.

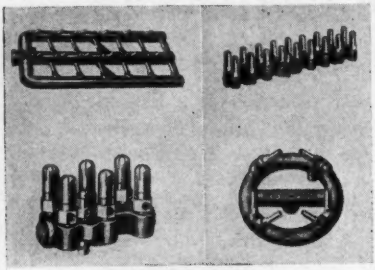
● The finest of urns may give trouble if ordinary rules of maintenance are neglected. Leaking faucets are common ailments which can be readily prevented by regular cleaning. All faucets are made so that they may be easily taken apart. Thorough cleaning removes dried coffee or hardened lime from the key. If neglected, the keyways become difficult to turn—and the dried coffee or lime makes deep scratches in the metal. This is the most frequent cause of leaking faucets. Proper cleaning eliminates this hazard and assures longer and more satisfactory service as well.



S. BLICKMAN, INC.

Manufacturers of Food Service Equipment

2105 Gregory Ave. • WEEHAWKEN, N. J.



BARBER

Appliance Burners

We make many types of Burner Units to fit a wide range of gas appliances. Nearly 200 appliance makers use Barber Burners. All Barber units correctly designed and equipped with proper jets to suit the appliance. Barber is the ONE burner which assures complete combustion on Butane-Propane or ANY OTHER gas. Appliance builders and fuel distributors give their customers better service, more economy, by advising the use of Barber-equipped appliances. Submit your burner problems to us. Complete new Catalog on request.

THE BARBER GAS BURNER CO.

3704 Superior Ave. Cleveland, Ohio

Thickstun

Butane-Propane-Natural Gas

There is a correct Thickstun manifold for every engine. Investigate today—for 21% more power, 10% better mileage and "extra" performance.

Immediate Delivery

Bu-Seal LP-Gas Fittings
Mileage Meters Fisher Regulators
Ransome Burners and Torches

ELECTRIC AND CARBURETOR ENGINEERING COMPANY

2323 E. 8th St. Los Angeles

Ellis, W. C. Hicks, C. A. Groff, R. L. Edwards, C. H. Thompson, Herman Adams, Everett Lovelace, E. D. Lockey, Jr., Earl Andrews, C. H. Lacey, C. M. Russey, C. H. Elliott, R. A. Villyard, and Joe Oberkampf.

Members of the board of directors elected Emory S. Kelley, Southeast Texas; W. C. Hicks, South Texas; E. D. Lockey, Jr., Northeast Texas; C. H. Lacey, North Texas; Joe Oberkampf, West Texas; C. H. Elliott, Northwest Texas; C. H. Thompson, Southwest Texas, and Herman Adams, Central Texas, to membership on the Executive Board.

The North Texas Regional District Association had a dinner meeting at the Blackstone hotel, Fort Worth, a few days in advance of the state meeting in order to elect and instruct its delegates. The same group met again at a dinner meeting in Denton, Texas, on April 13 to hear a report on the Waco Session. Twenty dealers attended.

C. H. Lacey, Acme Butane Equipment Co. and C. M. Russey, Southwest Stove & Supply Co., Fort Worth, brought back the report of the meeting. Mack Garvin, Butane Equipment Co., Fort Worth, is chairman of this group.

◆ ◆

LP-Gas February Production Less Than For January

Figures from the U. S. Bureau of Mines shows that production of liquefied petroleum gases in February dropped from 83,160,000 gals. to 70,980,000 gals.

Natural gasoline and recycling plants produced 60,732,000 gals. of the February totals. Refineries accounted for 10,248,000 gals.

ECONOMICAL SAFE

The Crook Company of Los Angeles, has that assurance from American. It is backed up with a record of more than twenty-five years of scientific engineering and specialized manufacturing.

All fabricating is with the best materials by skilled workmen with long experience in tank construction.

Pressure Tanks by American are "tailor made" to individual needs; welded throughout for strength; designed for efficiency in transporting and product handling; and priced right to insure maximum economy.

Talk with our consulting engineers regarding your requirements.

AMERICAN PIPE & STEEL CORPORATION

Manufacturers and Distributors

ALHAMBRA CALIFORNIA

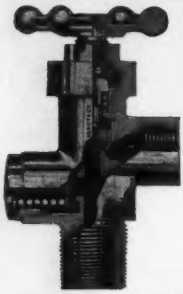
REPLACE OBSOLETE EQUIPMENT WITH BLODGETT BAKING & ROASTING OVENS

"Fifty to 75% of my customers have been using antiquated equipment," states an LP-Gas dealer. "If we can replace it, we will have a heavy and profitable year's work ahead—and we will conserve gas formerly wasted. One of the biggest load builders is the Blodgett Baking and Roasting Oven."

• These efficient commercial units are as easy to sell and to install as domestic units and they increase tank turn-over and so reduce delivery cost!

THE
G. S. BLODGETT CO.
INC.
53 Maple St. Burlington, Vt.

ON GUARD



AT ALL TIMES IS THE KEROTEST PROPANE-BUTANE CYLINDER VALVE

For controlling Propane-Butane gases *accurately*, depend on the Kerotest Propane-Butane Cylinder Valve. It's *safe* and extra-durable.

Write for Catalog.

KEROTEST

KEROTEST MANUFACTURING COMPANY
PITTSBURGH PA

BUTANE and PROPANE TANK HEADS

A.S.M.E. type
for the manufacturers of
BUTANE & PROPANE TANKS

* * * * STANDARD RADIUS * * * *
* * * * * 80% RADIUS * * * * *
* * * * * ELLIPSOIDAL * * * * *

DIAMETERS UP THROUGH 60"
THICKNESS UP THROUGH 1/2"

Write for Head Catalog

The COMMERCIAL SHEARING & STAMPING COMPANY
YOUNGSTOWN, OHIO.

Shell Chemical Co. Will Build Plant to Manufacture Butadiene

Construction of a large plant for the manufacture of butadiene, the principal ingredient of synthetic rubber, will be started immediately by Shell Chemical Co., according to J. Oostermeyer, president, San Francisco.

The new plant, which is to be financed by the Government as a part of its program to increase production of synthetic rubber, will cost approximately $15,000,000 and will be located in the West, according to the announcement.

Early experimentation, which developed new uses for synthetic rubber, was based on the butadiene production of a pilot plant located at Shell's laboratories. In the early fall of last year, the company began actual production on a large scale at a plant located in the Southwest.

The proposed plant, several times larger, will produce many thousand tons of butadiene annually and is expected to be in actual production in mid-year 1943.

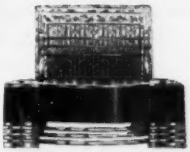
◆ ◆

Warren Petroleum Will Build 100,000-Gal. Indiana Plant

One of the largest gasoline plants ever constructed by the Warren Petroleum Corp., of Tulsa, Okla., has been announced for Evansville, Ind. To be known as the Calvin plant and situated midway between the Calvin and New Harmony fields, its capacity will be 15,000,000 cu. ft. of gas per day, which will be handled by 12 300-hp. vertical type compressors.

All of the various liquefied petroleum gases and any grade of natural gasoline will be possible to manufacture and segregate by the extraction plant, as designed. The total production goal is 100,000 gals. daily.

Build HEATING PROFITS
WITH
HUMPHREY RADIANTFIRES



There is no better way to speed up your load - building program than a campaign on these modern, inexpensive home heaters. Send now for the new, free 1941 - 42 Humphrey Sales Help Portfolio. It gives you complete plans for selling the beautiful new 400 Series Radiantfires and other Humphrey gas equipment.

GENERAL GAS LIGHT CO.
KALAMAZOO, MICHIGAN

"KEEP 'EM FRYING"
USE **PITCO**
Frialators
REG. U.S. PAT. OFFICE

SAVE FAT . . . GAS . . . SPACE

Deep-Fat Frying at Its Best

★ Customers can serve a wider variety of fried foods.
★ Left-overs or by-products quickly converted into daily specials.
★ Increase in customer business means increase in the gas load.
★ Actual saving in fat alone more than pays total cost of gas required to operate them.

Send for 1942 Illustrated Catalog.

J. C. PITMAN & SONS,
INCORPORATED
711-719 Broad St. Lynn, Mass.

We'll be happy to serve you when it's over!

When the country's best interests again permit expansion of liquefied petroleum gas marketing Philgas will, as before, offer outstanding advantages as a supplier of Propane and Butane

Present customers find that Philgas brings them the most complete production, shipping and service facilities in the industry, together with the assurance of quality products, produced to rigid specifications.

Philgas is proud to share the industry's contribution to serving the nation's needs in the war emergency, and pledges its full participation in the common effort.

Philgas
DIVISION
PHILLIPS PETROLEUM COMPANY

GENERAL MOTORS BUILDING
DETROIT, MICHIGAN

NEW YORK — MILWAUKEE
PHILADELPHIA — ST. LOUIS
CHICAGO — AMARILLO
BARTLESVILLE, OKLA.

THE NATION'S LARGEST MARKETER OF LIQUEFIED PETROLEUM GASES

Pacific Coast Distributors for Bastian-Blessing L.P.G. Equipment • Dayton Dowd Pump Co.

International Distributors for Day & Night I.C.C. Cylinders

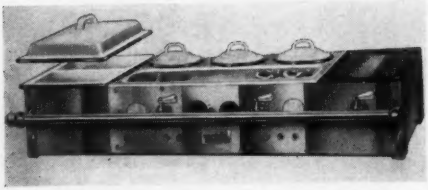
Manufacturers of Vapor Differential Compressors; Roney Valves & Fittings

LARGEST AND MOST EXPERIENCED MANUFACTURING ENGINEERS AND JOBBERS OF L. P. G. EQUIPMENT

Whatever the Need
Whatever the Problem
"WRITE RONEY"

L.C. RONEY INC.
1740-44 W. 59TH ST. - LOS ANGELES, CALIF.

MEXIHOT
Barbecue Machine



Cash in on this new field! This equipment is one of the fastest sellers on the market today due to the fact it serves a new line of sandwiches with very little time and attention . . . will increase your gas load and gives you a new field on a line on which deliveries can be made. Models ranging from $38.50 to $79.50. Write for distributorship today.

DEPARTMENT B6

DICKERSON MANUFACTURING CO.
Springfield, Missouri

ANSWERS

To Chapter 10

The Bottled Gas Manual

Here are the answers to the questions of Page 37 and which refer to problems in Chapter 10 of THE BOTTLED GAS MANUAL:

1. The expansion or contraction of matter under the influence of heat.
2. A. Gradual or throttling thermostats.
   B. Snap action or instantaneous thermostats.
3. Because it opens and closes gradually in direct proportion to the temperature whereas the snap action thermostat requires a relatively large amount of expansion in order to actuate the snap mechanism.
4. A. Economy of operation.
   B. Immediate response to demands for large amounts of heat.
5. When the demand for gas is beyond the capacity of a simple snap-action thermostat.
6. The by-pass or minimum flame.
7. Too high a by-pass or minimum flame.
8. A. Dirt.
   B. Ignorance.
9. A. Too low a by-pass or minimum flame adjustment.
   B. Incorrect burner design.
10. Fifteen per cent.

For Safety
and Economy

ETHYL MERCAPTAN

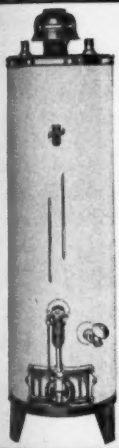
—Purified—

The ACCEPTED standard odorant for liquefied petroleum gases.

MALLINCKRODT CHEMICAL WORKS

ST. LOUIS NEW YORK

HOTSTREAM "V" LINE



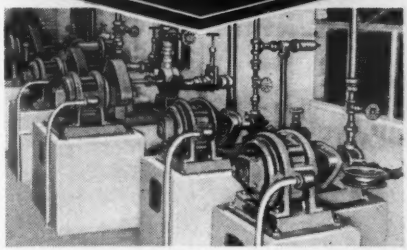
WATER HEATERS

- ★ Porcelain enameled
- ★ 15, 20, 30, 40, 60 gallon capacities
- ★ New fusion-weld process No gaskets used
- ★ Approved A.G.A. Accepted F.H.A., U.S.H.A., P.B.A., War Department
- ★ Guaranteed 20 years

Deliveries at Once

THE HOTSTREAM HEATER COMPANY
8007 Grand Avenue • Cleveland, Ohio

PROTECT THIS VITAL POINT

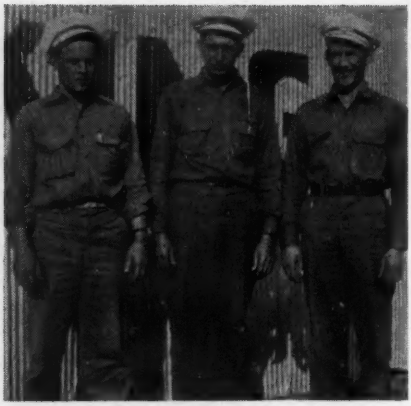


YOUR PUMP INSTALLATION

Pumps are hard to get. It pays, therefore, to safeguard your pumping equipment as never before . . . to prevent possible delay in War production work.

The Viking Service Manual is offered to you FREE to help you get utmost delivery from your Viking Rotary Pumps. It gives you information on correct installation, how to avoid repairs and replacements. Write for your copy today.

VIKING PUMP COMPANY
CEDAR FALLS, IOWA



Ennis Lee Haydon, Jim Tom Scott and Orval Ray, members of 100,000-Mile Club.

100,000-Mile Club Membership Encourages Safe Driving

Transport drivers who can pile up 100,000 miles of safe driving are worthy of special recognition, thinks B. T. Harris, manager of the Butane Gas Co., Inc., Little Rock, Ark., and he provides it by giving such employes of his firm memberships in his "100,000-Mile Club." Not only that, but they get a bonus check for $100, besides.

The men pictured on this page are Ennis Lee Haydon, Jim Tom Scott and Orval Ray, who reached the coveted mark just before last Christmas. None of them had any accident in 100,000 miles of driving 3000-gal. transports for gas delivery to company dealers in Arkansas.

◆ ◆

The Bastian-Blessing Co. Issues Revised Catalog Sections

The Bastian-Blessing Co., 4203 Peterson Ave., Chicago, Ill., has completed two revised sections to its Rego Catalog L-500. These are LE, which is devoted to cylinder valves and shut-off valves, and LJ, which concerns liquid level and pressure gages manufactured by the company.

A general discussion of the valves and gages considered in LE and LJ respectively is followed by a detailed description of individual items, clearly illustrated. Specifications and applications are given.

These sections may be procured by writing The Bastian-Blessing Co.

◆ ◆

Three Ensign Men Join U. S. War Forces

Geo. E. Swann, of Dallas, Texas, became the third Ensign Carburetor Co. employe to join Uncle Sam's forces in recent weeks when he resigned late this month from his position as assistant branch manager of the Texas office. Mr. Swann will be attached to the automotive specialist group of the Ordnance department.

A second Ensign man to become a part of the armed forces is Claude E. Brumfield. Mr. Brumfield has been employed as a salesman, working out of the Huntington Park, Calif., office. He enlisted in the Coast Guard.

Also joining in the war effort is Kenneth Beaudry, until recently a field engineer working out of the Chicago office of the Ensign organization. Mr. Beaudry will be attached to the staff of the Ordnance department, working as a civilian engineer.

◆ ◆

Fred G. Small, New York Advertising Man, Dies

Fred Glen Small, aged 50, owner of the New York advertising agency of that name, died at his home in Rockville Centre, N. Y., March 24, after a brief illness.

Mr. Small had spent 25 years in the advertising profession, specializing in industrial accounts, among them that of the Vulcan Proofing Co., of Brooklyn, N. Y.

DEFEND HEALTH

WITH A

CONTINENTAL WATER HEATER

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AMERICA NEEDS PHYSICAL FITNESS

Good health depends on cleanliness and cleanliness depends on hot water.

A.G.A. Approved

Continental WATER HEATER CO. LTD.
1801 Pasadena Ave., Los Angeles

SPARTAN Automatic Storage

ALGAS BUTANE PROPANE
CARBURETION

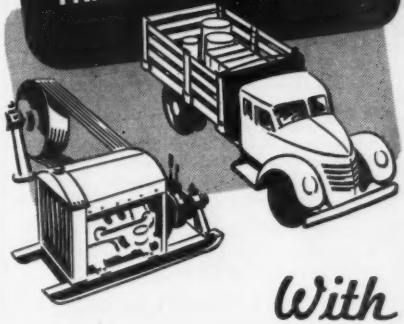
ADD WINGS

To Your War Effort

Opportunity awaits those who are "geared to war production." Algas specializes in L P Gas to solve your problems and aid in meeting defense industry requirements. To speed your war effort—consult Algas!

American Liquid Gas Corp.
1109 S. Santa Fe, Los Angeles, Calif.

POWER, SPEED for TRUCKS, TRACTORS, ENGINES



With

SINCLAIR

BUTANE and PROPANE

For a thousand uses in internal combustion engines on highways, farms and construction jobs; in mines, factories and industrial plants, Sinclair L P-Gas is rendering trojan service today when conservation of natural resources and fuel are essential to the success of our War Production program.

SINCLAIR PRAIRIE OIL COMPANY

Liquefied Petroleum Gas Division
Sinclair Building Tulsa, Okla.

BU-PRO-FIRE

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HEATERS AND
FLOOR FURNACES
FOR L. P. GASES

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Bu-Pro-Fire Heaters and Floor Furnaces are designed and built especially for use with liquefied petroleum gases. Every Model is finished in "Lifetime" Porcelain Enamel and is guaranteed to give satisfactory Heating Service. A wide range of sizes provides a Model for every heating need. A. G. A. Approved. Write for illustrated catalog and prices.

TENNESSEE ENAMEL MFG. CO.
Nashville, Tennessee

We are SORRY
and
We are GLAD

SORRY for conditions that make it impossible to serve you.

GLAD of the chance to sacrifice for the war effort.

National Butane Gas Co.
Memphis Tennessee

CLASSIFIED

Classified advertising is set in 6-point type, without border or display, at the rate of 10 cents per word per insertion; minimum charge per insertion $2. Box numbers for replies count as 5 words. Count as a word each one letter word and each group of figures. Classified advertising is only accepted when payment accompanies order. Copy and payment must reach publisher's office prior to 10th of month preceding publication.

EQUIPMENT FOR SALE

A LAST CHANCE TO BUY L P G CYLINders. We have for sale 300 L P G cylinders which were in Blau Gas Service. Following are some of the details on these cylinders: Hold 20 lbs. of Propane, tested at 3,000 lbs., no ICC markings, diameter 5½", height 34", square bottom ring, weight 45 lbs., capacity 830 cubic inches. These cylinders are a real buy. For full details, picture and price, write BURDETT OXYGEN COMPANY OF CLEVELAND, 3300 Lakeside Avenue, Cleveland, O.

PROPANE STORAGE TANKS 150-GALLON and 2000-gallon sizes. Butane Tanks 200-gallon and 500-gallon sizes. Address POWER CONSTRUCTION COMPANY, Minneapolis, Minn.

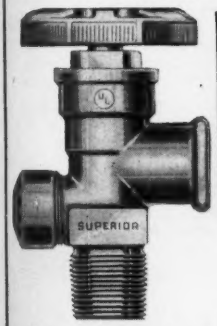
Souza Bros., Turlock, Calif., Dissolve Partnership

John Souza, heretofore associated with his brother, Manuel, in operation of the Souza Bros. plant on Bradbury Road in Turlock, Calif., has announced their dissolution of partnership and the establishment of Souza's butane sales and service business on the North Highway at the city's limits.

HOT Water
UNITED STATES
Automatic Water Heaters
Approved by A.G.A. for Liquefied Petroleum Gas
United States Heater Co.
COMPTON, CALIFORNIA

IN TEXAS IT'S
THE BUTANE COMPANY
for
WHOLESALE DELIVERIES DIRECT TO YOUR BULK STORAGE PLANT.
the BUTANE Company
• BROWNWOOD, TEXAS
WHOLESALE TRANSPORTERS—DISTRIBUTORS OF BUTANE

Superior LP-GAS
CYLINDER VALVES



Listed as Standard and for Re-examination Service By Underwriters' Laboratories

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Write for Bulletin LP-8 For details on cylinder valves; and valves and accessories for bulk stations; above and below ground installations.

SUPERIOR VALVE & FITTINGS CO
1509 WEST LIBERTY AVENUE
PITTSBURGH, PENNSYLVANIA

Are You in a Haze?

Many are when it comes to technical questions and new situations arising in the varied applications of liquefied petroleum gas, equipment and appliances. Maybe we can help you. If confronted by conditions you do not understand or problems that are beyond your experience, ask

BUTANE-PROPANE News

Research Department

for assistance. Our technical staff will gladly endeavor to answer all legitimate inquiries (except legal and financial) about the LP-Gas industry which regular subscribers choose to submit.

Use this sheet or your own letterhead.

Your Name.....

Your Position .....

Your Company.....

Your Address .....

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Your Question

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SCAIFE 4-WAY TESTING Safeguards your pay-loads!

Every Scaife Cylinder must pass the required I.C.C. Hydrostatic Test in a water jacket after first passing two preliminary pressure tests and inspections.

Withdrawing the cylinder from the jacket after testing.

Additional test with compressed air at a pressure in excess of service pressure again proves its quality. Our testing apparatus is of the most modern design and meets all legal safety requirements.

● Every Scaife LP-Gas Cylinder must pass four thorough, rigorous tests before shipment. Examined repeatedly at a multiple of the service pressure by air and water, and under impact, the tightness and dependability of every Scaife Cylinder is proved!

This is an example of the care used by Scaife to insure highest quality.

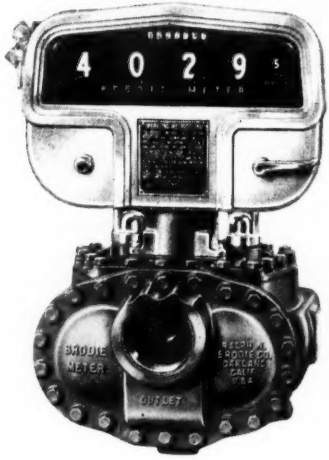
SCAIFE COMPANY

General Offices and Works:
Oakmont (Pittsburgh District), Pa.
Representatives in Principal Cities

★ BUTANE ★

WITH BRODIE METERS

Conservation of time, manpower, equipment and even Butane itself is more vitally essential today than ever before. More efficient handling and routing of deliveries with Brodie Meters permits greater gallonages to be handled and more territory to be covered with less mileage and less waste at a lower cost. To serve the best interests of your customers, your community and your country, conserve with Brodie Meters. Write today for full details.



Ralph N. Brodie Co., Inc., 945 61st Street, OAKLAND, California, U. S. A.
Cable Address: "BRODICO." *Division Offices:* Chrysler Bldg., NEW YORK CITY
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